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## MAINTENANCE AND ADJUSTMENT

### Service

Your SSB radiotelephone has been factory aligned and tested to specification before shipment. Under normal circumstances the SSB radiotelephone will operate in accordance with these instructions. All adjustable trimmers and coils in your SSB radiotelephone has been adjusted at the factory and should only be readjusted by a qualified technician with proper test equipment. Attempting service or alignment without factory authorization can void the SSB radiotelephone's warranty.

When operated properly, the SSB radiotelephone will provide many years of service without requiring realignment. The information in this section gives some general service procedures which can be accomplished without sophisticated test equipment.

Should it ever become necessary to return the equipment to your dealer or service center for repair, pack it in its original box and packing, and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem.

### Service note :

If you desire to correspond on a technical or operational problem, please make your note short, complete, and to the point, and PLEASE make it readable.

Please list: Model and Serial Number

The problem you are having.

Please give sufficient detail to diagnose. Information such as other equipment in the station, meter readings and anything else you feel might be useful in attempting diagnosis .

### Caution :

Do not pack the equipment in crushed newspapers for shipment. Extensive damage may result during shipment.

### Notes :

1. Record the Date of Purchase, Serial Number and Dealer from whom purchased.
2. For your own information, retain a written record of any maintenance performed on the unit.
3. When claiming warranty service, a photocopy of the bill of sale, or other proof of purchase showing the date of sale must accompany the radio.

## MAINTENANCE AND ADJUSTMENT

### Adjustment

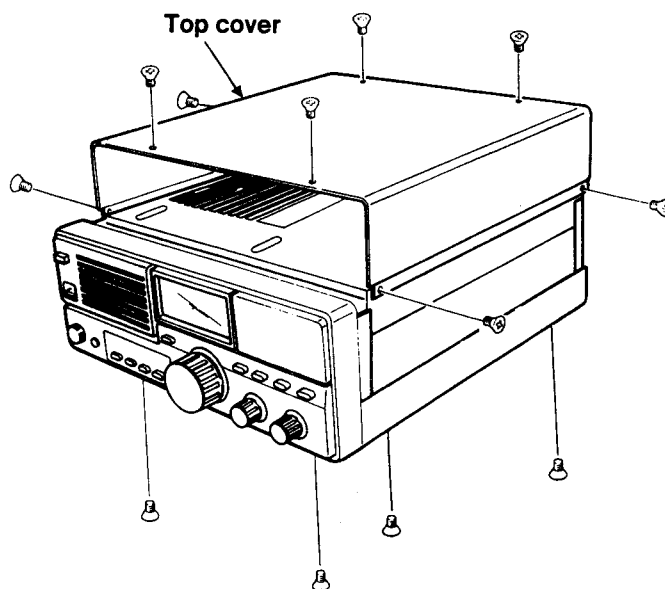
#### 1-1. Cover removal

##### Caution

Before removing the cover, turn the DC power supply's power switch OFF and disconnect the power cable.

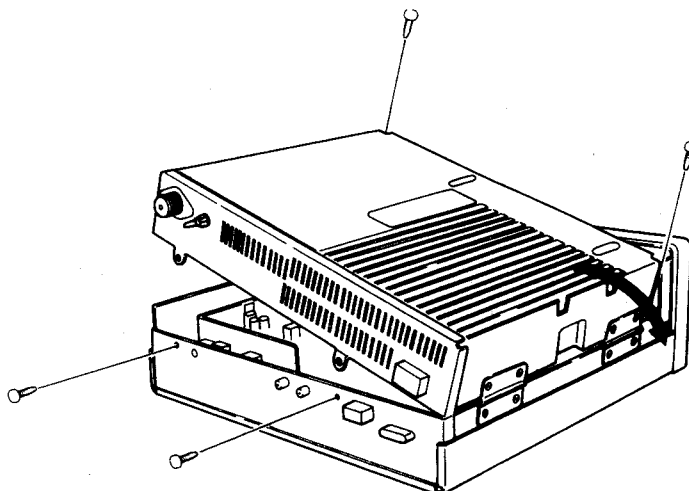
Do not pinch wiring when opening or closing cases.

Remove the top cover (8 screws), and the bottom cover (4 screws) from radiotelephone.



#### 1-2. Sub chassis removal

Remove the 4 screws as shown in the diagram. Open in a counterclockwise direction.

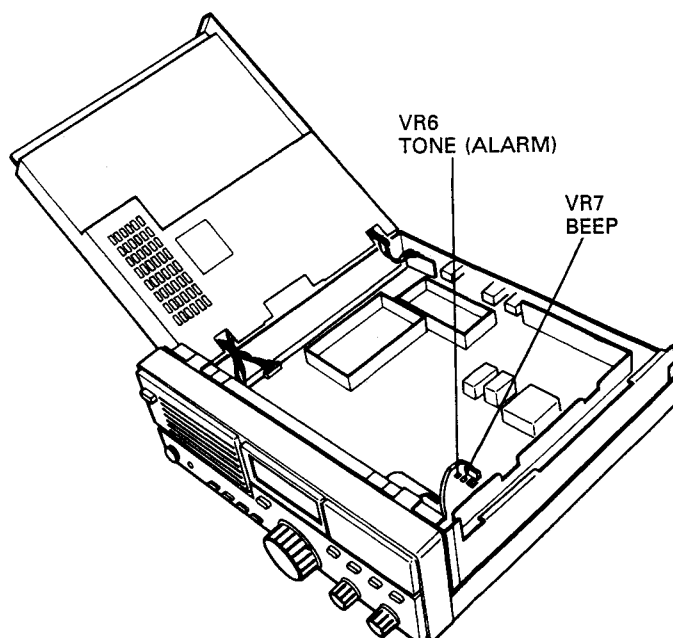


#### 1-3. Beep tone level

Turn VR7 to the desired BEEP tone level.

#### 1-4. Tone level

1. Press the TONE key.
2. Turn VR6 to the desired TONE level.

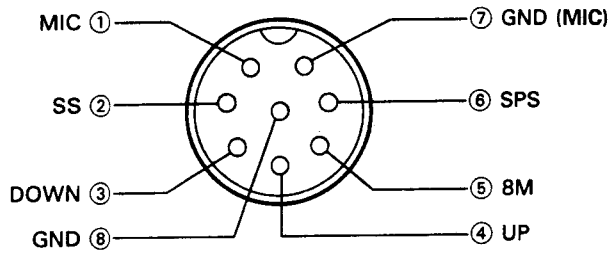


# TRC-70

## MAINTENANCE AND ADJUSTMENT

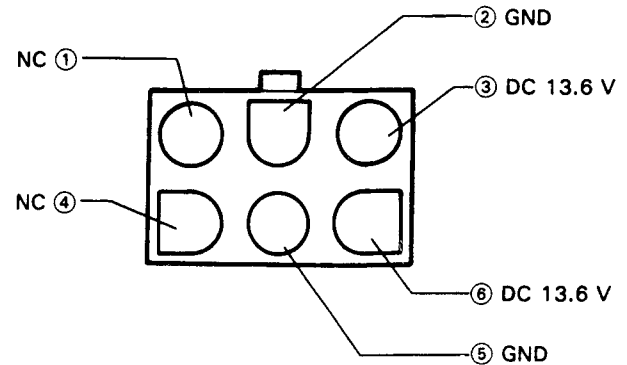
### 1-5. Microphone connector

Front view

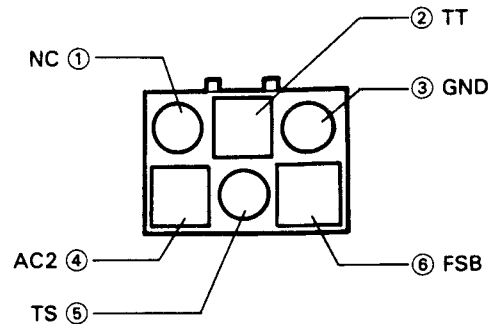


- ① MIC Impedance approx. 600Ω
- ② SS Stand-by switch
- ③ DOWN Frequency or Memory channel number decrease
- ④ UP Frequency or Memory channel number increase
- ⑤ 8M 8V( Max.100mA)
- ⑥ SPS Receive audio output
- ⑦ GND(MIC) Mic ground
- ⑧ GND Ground

### 1-6. 13.6 VDC Power input connector



### 1-7. Antenna coupler connector

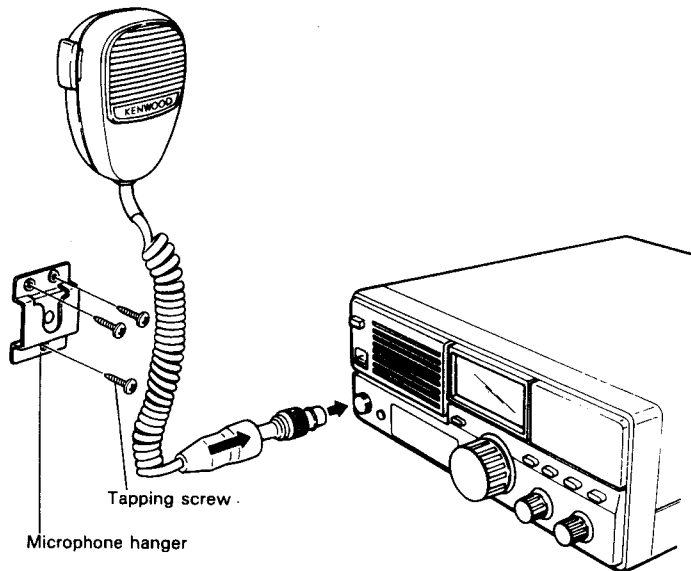


- ① NC Not used
- ② TT Control signal input/output
- ③ GND Ground
- ④ AC2 Antenna current input
- ⑤ TS Control signal input/output
- ⑥ FSB Power.output for antenna coupler



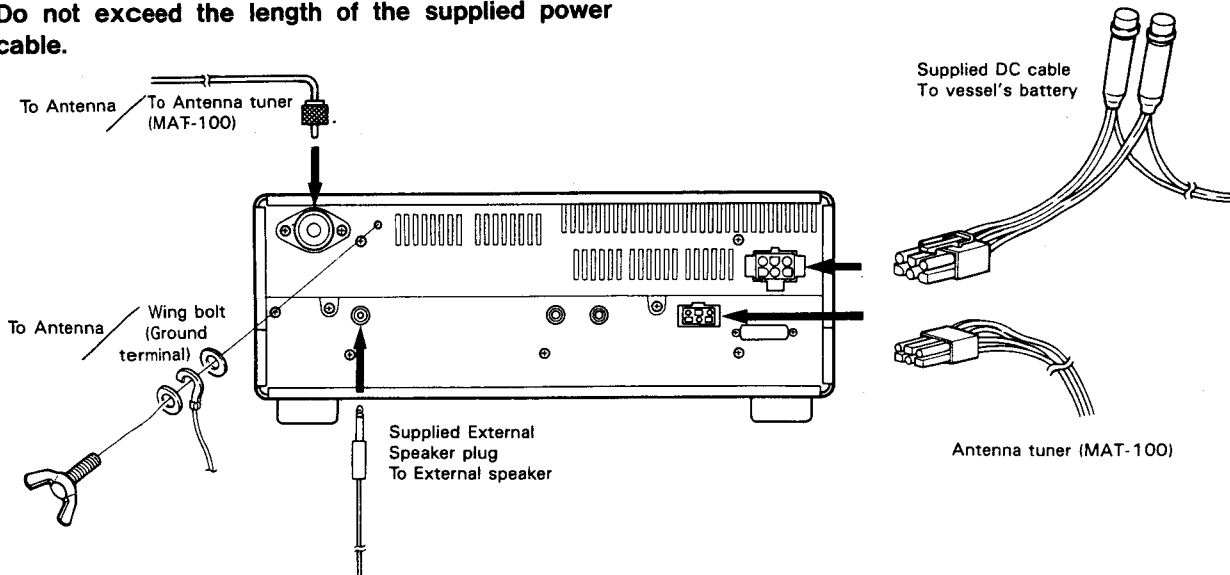
## INSTALLATION INSTRUCTIONS

### Microphone hanger



### Connection

This radiotelephone requires a maximum of 30 A at 13.6VDC  $\pm$  15% when transmitting at full power. Do not exceed the length of the supplied power cable.



### Without antenna coupler

The type of antenna that is used will greatly affect the performance of the equipment. Use a properly adjusted antenna, of good quality, to enable your equipment to perform at its best. The antenna input impedance is 50 ohms. Use 50 ohm coaxial cable such as RG-8U or 8D-2V for this connection. If the antenna is far from the transceiver the use of low loss coaxial cable, such as RG-8U is recommended. Match the impedance of the coaxial cable and that of the antenna so that the SWR is less than 1.5. The protection circuit in the transceiver will activate if the SWR is particularly poor (greater than 3). High SWR values will cause the transmitter output to drop.

### With antenna coupler

A wire antenna must be in the range from 2 to 24 MHz and having a total length of 12 to 23 meters. When the radiotelephone is operated only on low frequencies, a longer antenna is preferable. The antenna should be erected as high as possible. The insulator should be able to withstand high transmitter power levels without leakage.

### Typical installation and connection

Connect the Antenna connector of the radiotelephone to the RF IN jack with the coaxial cable, such as RG-8U are recommended. Connect the 6P connector of the supplied control cable to the radiotelephone. Please refer to the MAT-100 Instruction Manual to connect with the cable to the MAT-100.

# TRC-70

## CIRCUIT DESCRIPTION

### Frequency Configuration

The TRC-70 operates as a double conversion system for both transmission and reception. (See Figure 1.)

#### • Receiver system

The receive signal from the ANT terminal passes through the final unit and the TX-RX unit LPF and is applied directly to mixers Q9 and Q10 (2SK125-5). Here the signal is mixed with the first local oscillator frequency (71.395~101.295 MHz) from the PLL in order to generate the first IF signal of 71.295 MHz. The receive frequency may be fine tuned with the clarifier by varying the first local oscillator frequency.

The 71.295 MHz first IF signal passes through a monolithic filter (MCF) and is mixed with the second local oscillator frequency (60.6 MHz) by MIX FETs Q13 and Q14 (2SK520(K44)) to generate a 10.695 MHz second IF signal. The second local oscillator signal is generated by the TX-RX unit Q90 and Q91 (2SC2714(Y)) and is then doubled by Q56 (2SC2714(Y)).

The second IF signal (10.695 MHz) passes through a crystal filter, and is then applied to IC2 : KCD03 where the signal is demodulated. The demodulated audio output is amplified by the AF preamplifier and power amplifier to drive the speaker.

#### • Transmitter system

The audio signal from the microphone is amplified by mic amplifiers Q37 and Q38 : 2SC3324(G), and is then combined with the carrier oscillator in the balanced modulator, (IC6 :  $\mu$ PC1037A) to generate the TX first IF (10.695 MHz).

In the H3E mode, a carrier signal is added to the TX first IF (10.695 MHz). The TX first IF is then mixed with the second local oscillator frequency (60.6 MHz) by IC7 : SN16913P in the same manner as the receiver system, to produce a 71.295 MHz signal. This signal is then mixed with the PLL first local oscillator frequency in order to generate a transmit signal.

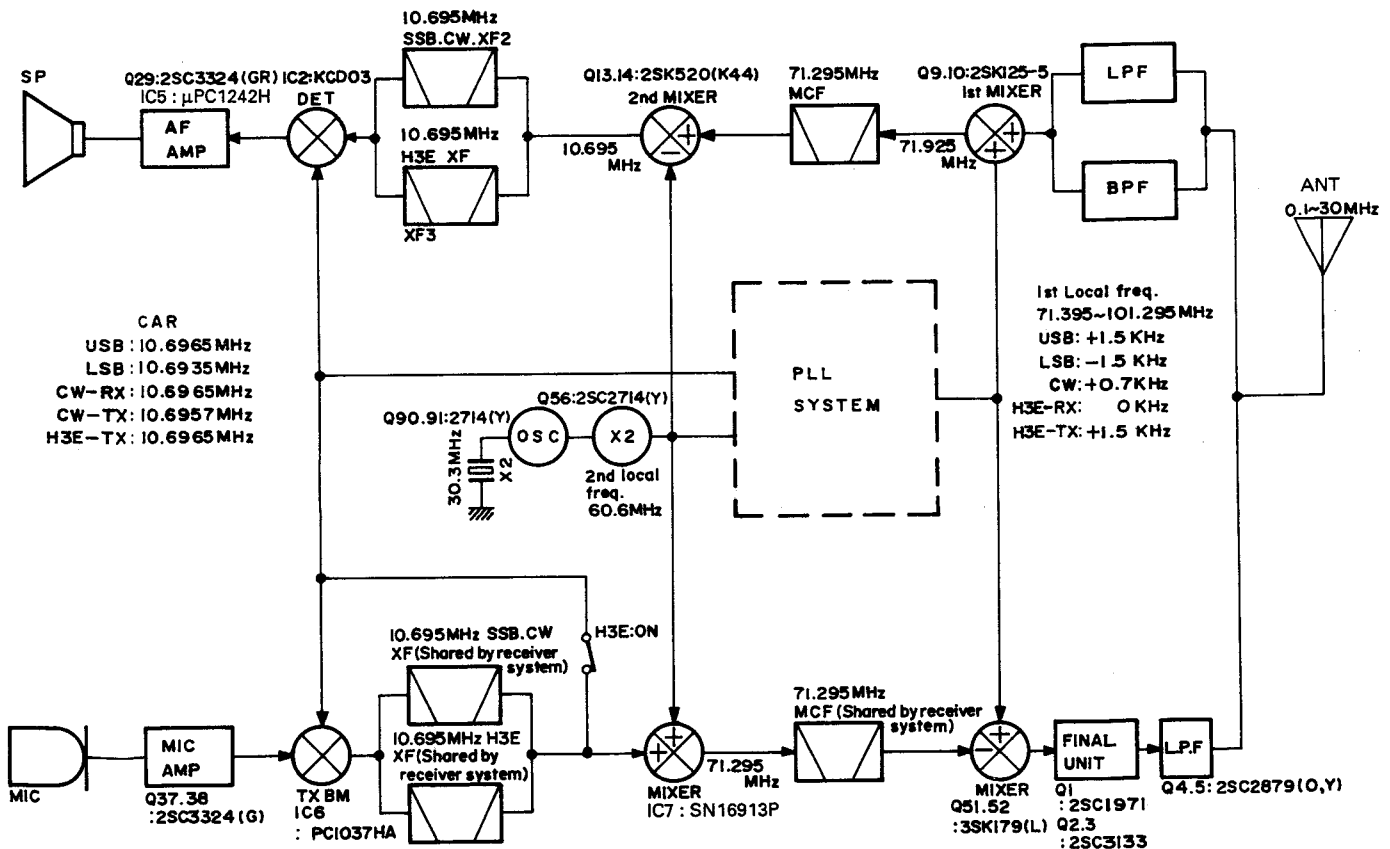


Fig. 1 Frequency configuration

## CIRCUIT DESCRIPTION

### PLL (Phase Locked Loop)

The TRC-70 PLL is divided into a HET loop and a CAR loop. The HET loop consists of loop A and loop B, and the CAR loop consists of loop C. Figures 2 and 3 show a block diagram of the HET and CAR loops. The following paragraphs describe loops A, B, and C.

The reference frequency for loops A, B, and C is 10.1 MHz. This frequency is generated by dividing the 30.3 MHz reference oscillation frequency by 3. Therefore, the frequency accuracy of the HET and CAR is determined by the 30.3 MHz oscillation circuit.

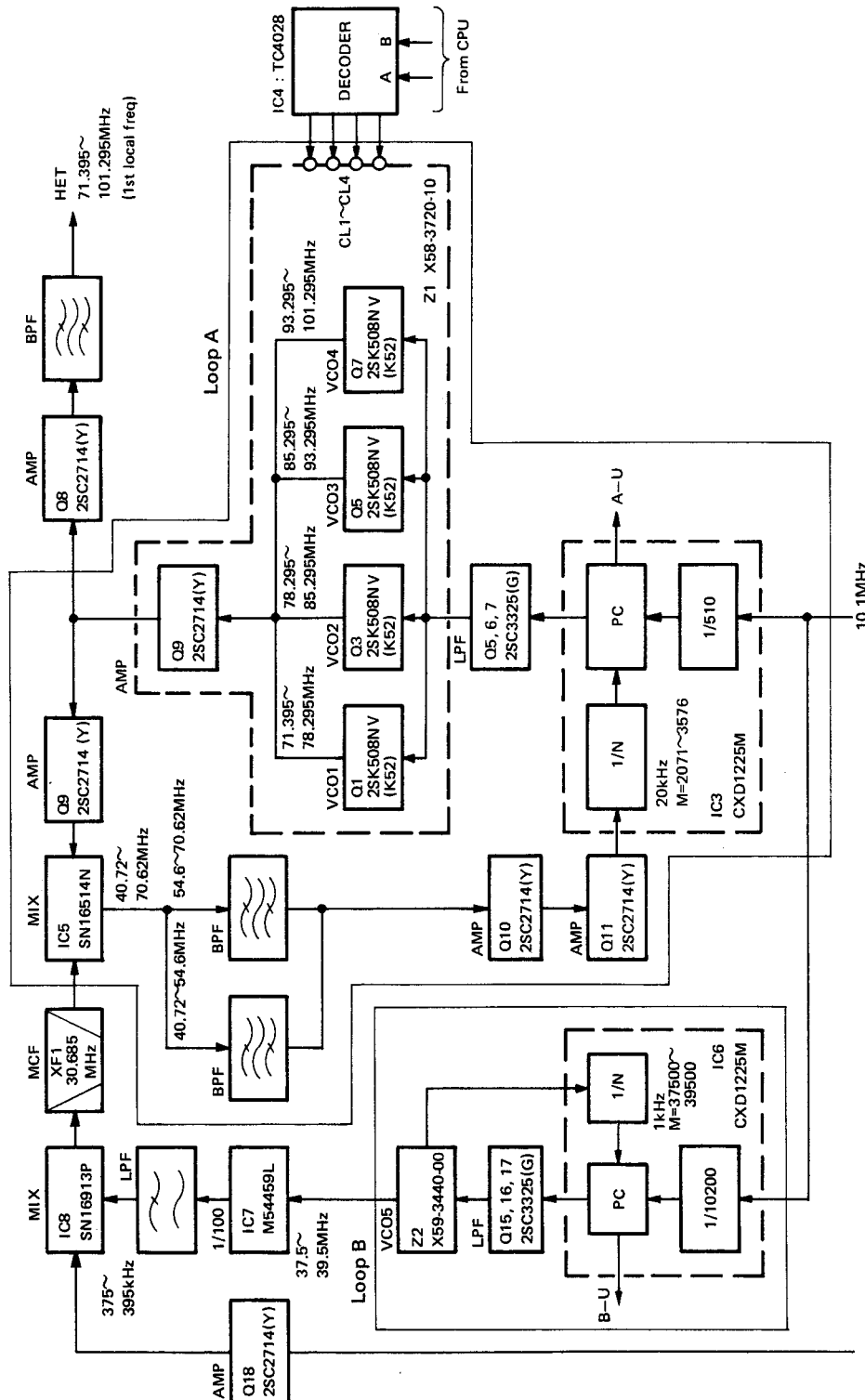


Fig. 2 Block diagram of PLL HET loop

## CIRCUIT DESCRIPTION

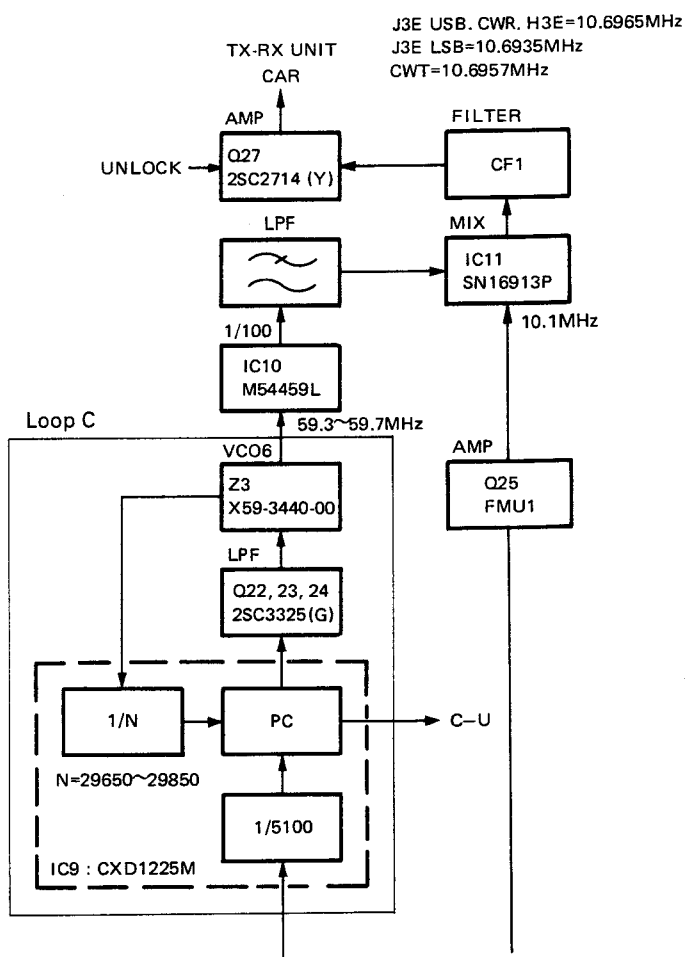
Loop B generates a 37.5~39.5 MHz signal via IC6 (CXD1225M) with a 1 kHz comparison frequency. The 37.5~39.5 MHz signal is generated by VCO6 (X59-3440-00), then divided by 100 in IC7 : M54459L to generate a 10 Hz steps. Fine-frequency adjustment by means of the clarifier is added to loop B under micro-processor control. The 375~395 kHz output signal that was divided by 100 by IC7 is mixed with the 30.3 MHz signal by IC8 : SN16913P in order to generate a 30.675~30.695 MHz signal. This frequency passes through MCF (XF1; 30.685 MHz) and enters IC5 (SN76514N).

Loop A generates a 71.395~101.295 MHz signal via IC3 (CXD1225M) with a comparison frequency of 20 kHz. This signal becomes the HET oscillator signal. The loop A VCO (X58-3720-10) consists of four separate VCO circuits which are selected by IC4 (TC4028) according to the control data from the microprocessor. (See Table 1.) Part of the loop A VCO output passes through the buffer amplifier of Q9 : 2SC2714(Y) and is applied to IC5. The signal is then mixed with the signal from loop B in IC5 : SN76514N (40.72~70.62 MHz). The resulting 40.72~70.62 MHz signal passes through BPF1 and BPF2. VCO1 and VCO2 pass the signal through BPF1, and VCO3 and VCO4 pass it through BPF2. The signal passing through the BPF is amplified by Q10 and Q11 : 2SC2714(Y) and is then applied to PLL IC3 (CXD1225M).

Loop C generates a 59.3~59.7 MHz via IC9 (CXD1225M) with a 2 kHz comparison. This VCO output is divided by 100 by IC10 : M54459L, and is mixed with 10.1 MHz by IC11 : SN16913P to generate a 10.693~10.697 MHz signal. The 10.693~10.697 MHz signal passes through ceramic filter CF1 to become the CAR signal. The CAR signal changes with the mode. It is amplified by Q27 and is then sent to the TX-RX unit.

Frequency Function		0.1~7MHz	7~14MHz	14~22MHz	22~30MHz
Microprocessor control signal	V1	0	1	0	1
	V2	0	0	1	1
VCO		VCO1	VCO2	VCO3	VCO4
BPF		BPF1	BPF1	BPF2	BPF2

Table 1 Switching of Loop A VCO and BPF



**Fig. 3 Block diagram of PLL CAR loop**

## CIRCUIT DESCRIPTION

- CAR stop circuit in AM receive mode**

In the CW and SSB modes, the 8 V DC power for the last mixer IC (IC11 : SN16913P) of the CAR loop is supplied through Q26 : 2SC2712(Y). In the H3E receive mode, 8 V is applied to pin 3 of the TX-RX unit shift register IC10 (TC9174F) according to the data supplied from the microprocessor. The 8 V is supplied to the control unit via the CAR coaxial cable.

This sets Q28 : DTC114EK on, changes Q26 from on to off, disables IC11, and stops CAR.

- Unlock circuit**

Normally 8 V (8C) is fed to the HET and CAR transistors Q8 and Q27 via Q21. (Q21 is on.) When any of the PLL loops (loop A, B, and C) should unlock, pin 8 of the corresponding PLL IC (IC3, IC6, IC9 : CXD1225M) will go H (5V). This causes Q19 to switch on, and Q20 and Q21 to switch off. This action causes the voltage applied to Q8 and Q27 to be removed. Meanwhile Q29 switches on, and LED D10 turns on to indicate the unlocked state.

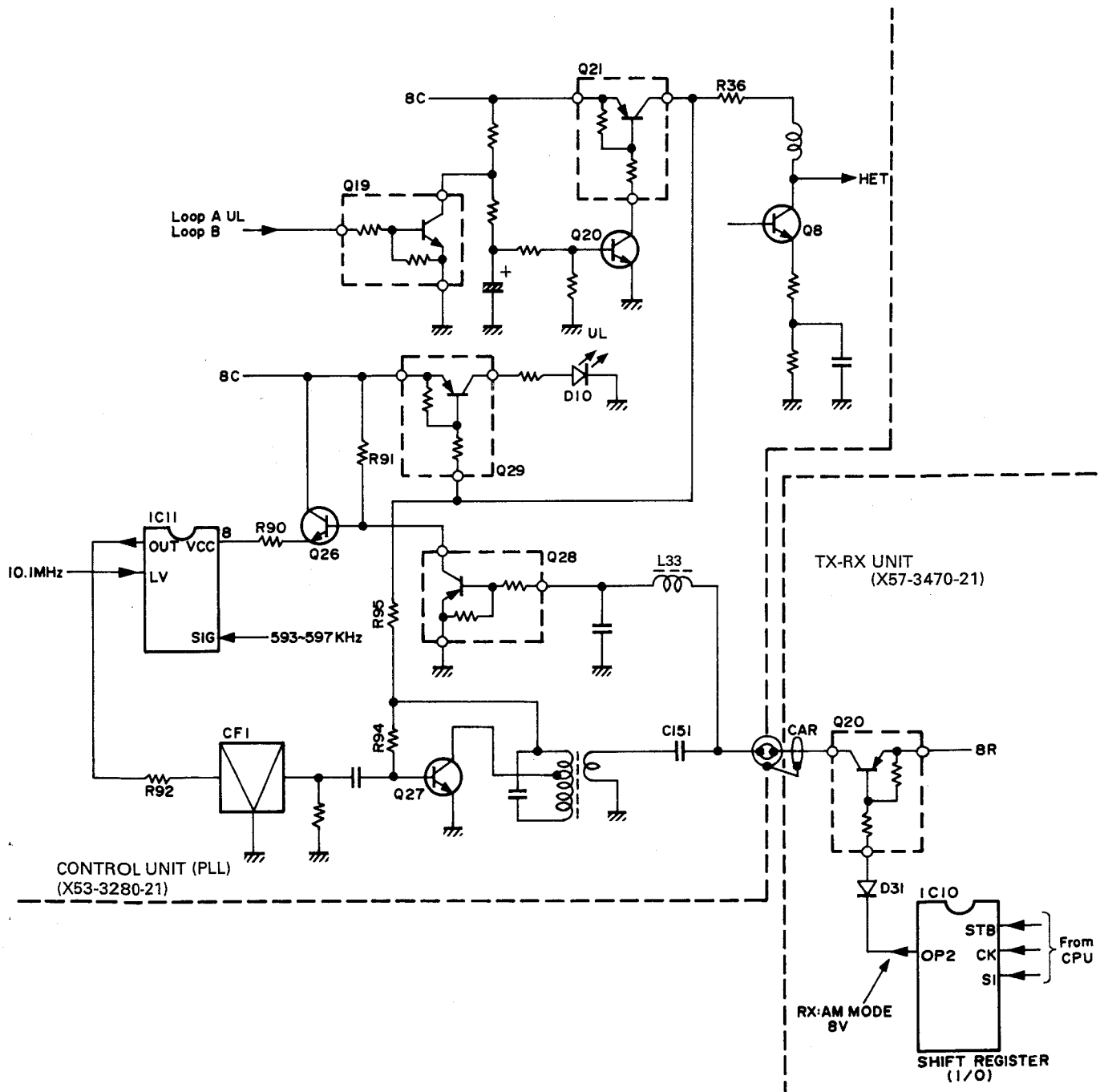


Fig. 4 CAR stop circuit in AM receive mode and PLL unlock circuit

## CIRCUIT DESCRIPTION

### Control Unit

#### Control unit configuration

The main LSI chips in the control unit include CPU : IC302, ROM : IC310, EEPROM : IC311, and extended I/O IC : IC300.

The CPU reads the program from the ROM, reads/writes memory channel data to EEPROM, and inputs and outputs signals from the CPU ports or extended I/O IC ports.

The address signal (8 low-order bits) required for the CPU to access the ROM, EEPROM, and extended I/O IC is multiplexed with other data and output to the bus line. The address is maintained for the necessary period of time by latching IC303.

The chip select (CS) signal, which selects a the desired device (ROM, EEPROM, etc.), is supplied to each device by decoding the address signal by IC304 : TC74HC138AF.

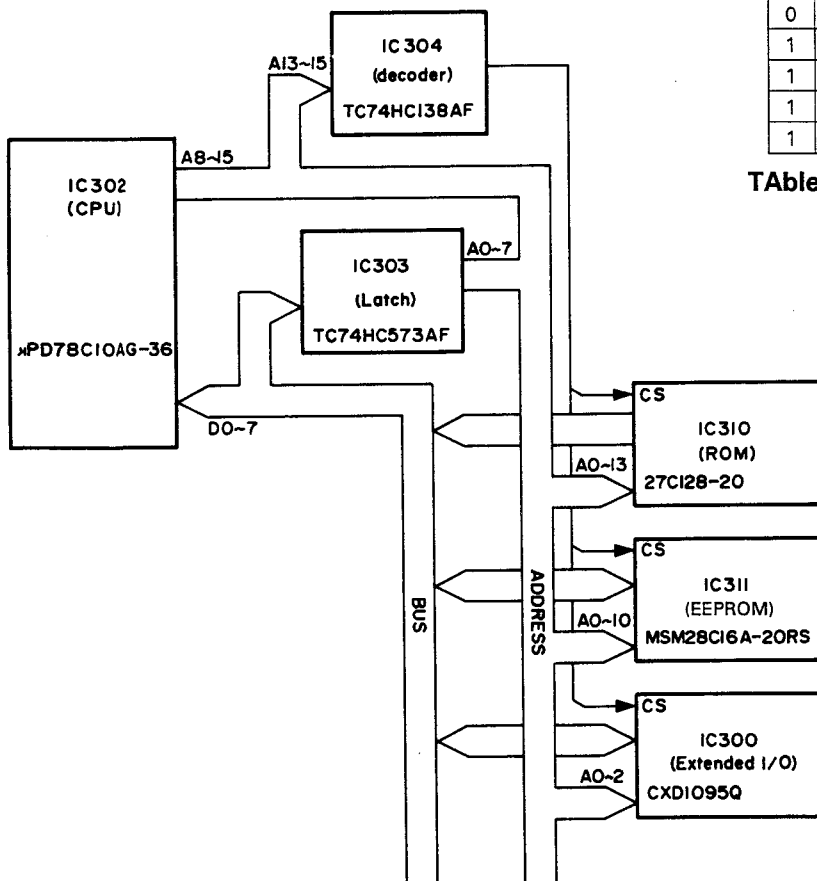
#### Bus operation

The ROM (IC310), EEPROM (IC311), and extended I/O IC (IC300) are connected to the CPU (IC302) via the bus line. When the CPU accesses these ICs (IC310, IC311, and IC300), the address signals (A13 to A15) output from the CPU are decoded by IC304, and the IC is specified by the CS signal. IC310 (ROM) uses the CPU address signal A15 as a CS signal.

Table 2 is a truth table for IC304.

This bus is a multiplexed bus onto which an address code and data are output alternately. Therefore, when the CPU accesses one of the ICs, the necessary address signal is latched by IC303.

This latch uses the positive pulse applied to the ALE pin, after the CPU outputs an address.



INPUT			OUTPUT							
A	B	C	$\overline{Y_0}$	$\overline{Y_1}$	$\overline{Y_2}$	$\overline{Y_3}$	$\overline{Y_4}$	$\overline{Y_5}$	$\overline{Y_6}$	$\overline{Y_7}$
0	0	0	0	1	1	1	1	1	1	1
0	0	1	1	0	1	1	1	1	1	1
0	1	0	1	1	0	1	1	1	1	1
0	1	1	1	1	1	0	1	1	1	1
1	0	0	1	1	1	1	0	1	1	1
1	0	1	1	1	1	1	1	0	1	1
1	1	0	1	1	1	1	1	1	0	1
1	1	1	1	1	1	1	1	1	1	0

Table 2 Truth table for IC304 : TC74HC138AF

Fig. 5 Control unit block diagram

## CIRCUIT DESCRIPTION

### • Key scan

Active L pulses are output from S0 (PC0 pin 11) to S6 (PC7 pin 18), in the order listed, and input through ports K0 (PB3 pin 5) to K4 (PB7 pin 9). Which switch has been pressed is determined by finding where the lines intersect on the matrix.

### • Display

The CPU calculates the display data and transfers 112-bit serial data to the LCD module. The LCD driver IC in the LCD module lights the LCD dynamically with 50% duty cycle.

Figure 6 shows the serial data waveform.

matrix		Scan input				
		K0	K1	K2	K3	K4
Scan output	S0	ENT	MOD	3	2	1
	S1	SCN		6	5	4
	S2	C/FUNC	0	9	8	7
	S3	TUNE	SQL	NB	DIMMER	TONE
	S4					
	S5					
	S6	DIP1	DIP2	DIP3	DIP4	
	S7	D311	D312	D313	D314	

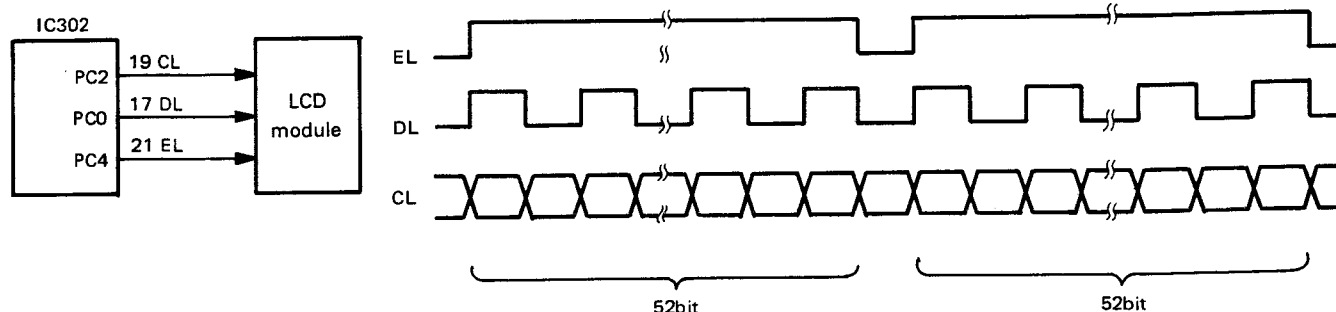


Fig. 6 Serial data waveform

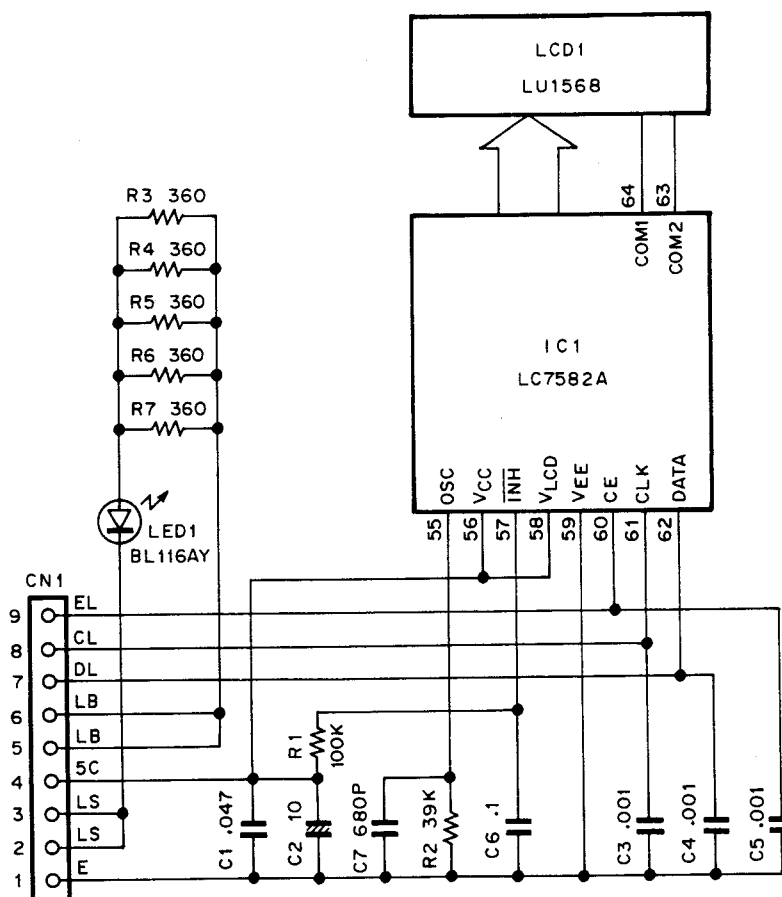


Fig. 7 LCD module circuit diagram

## CIRCUIT DESCRIPTION

### • Backup

The TRC-70 backs up data in two ways. The first is a semipermanent backup that backs up memory channel data in the nonvolatile memory EEPROM. The second is a lithium cell that backs up the operation status in the CPU RAM.

The CPU backup is performed by monitoring the CB (13.6 V) line. If the voltage falls below the prescribed level, the CPU STOP pin is activated and CPU power consumption is reduced. When the power consumption is low, the CPU stops generating clock signal, which places each port is at a high impedance level.

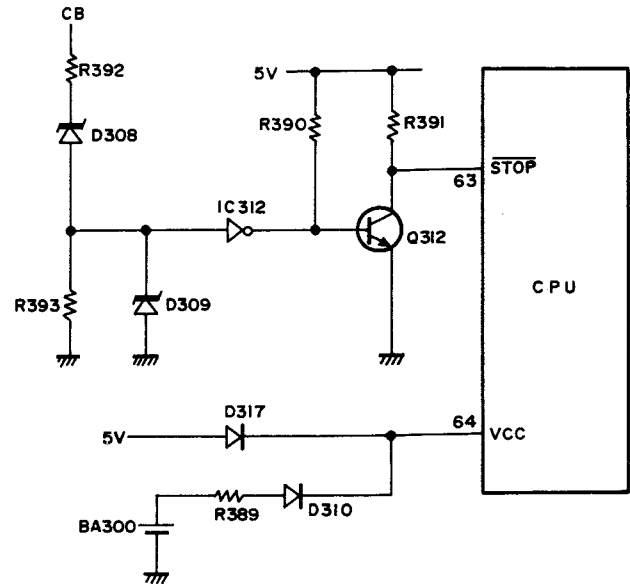


Fig. 8 Backup circuit

### • System reset circuit

IC305 (M51951BML) is the system reset IC that monitors the power supply voltage. If the voltage falls below the prescribed level, it outputs a reset signal to the main CPU to stop execution and inhibit memory write functions.

If the power supply voltage again exceeds the prescribed level when the power is on, the reset signal is released, the main CPU is initialized, and execution is resumed after the time constant of R375 and C379 has elapsed.

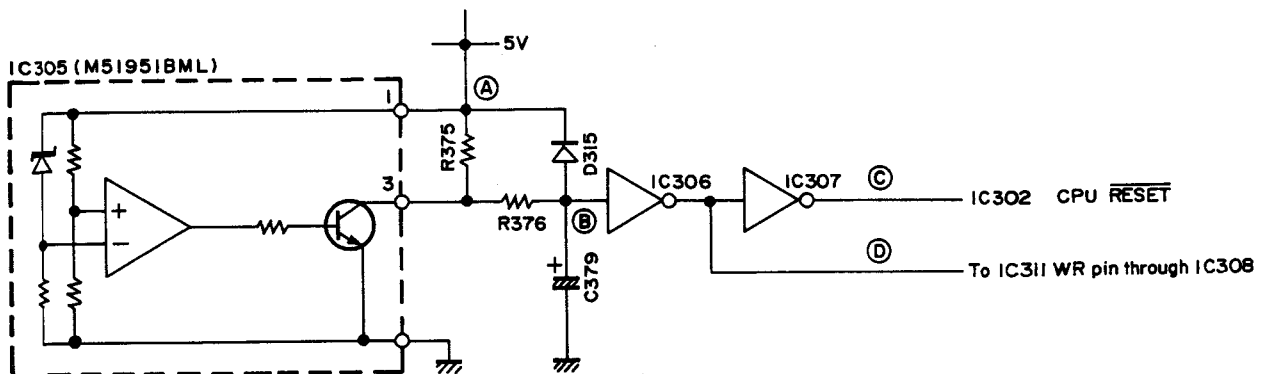
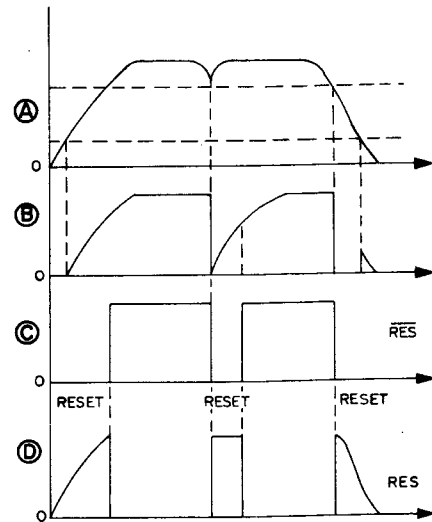


Fig. 9 Reset circuit and timing chart



## CIRCUIT DESCRIPTION

### • Clarifier

When the clarifier knob is turned a DC voltage corresponding to the rotation angle is produced. The input voltage is A/D converted by the CPU and PLL data is controlled.

The data is controlled in the CPU so that the curve

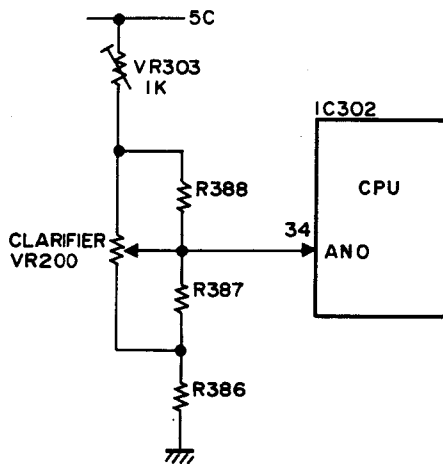


Fig. 10-1 Clarifier circuit

shown in Figure 10-2 is obtained. Operation of the circuit is improved by enlarging the zero area at the center of the rotation angle.

The zero point of the clarifier is adjusted by setting the knob to the mechanical center, then setting zero with VR303.

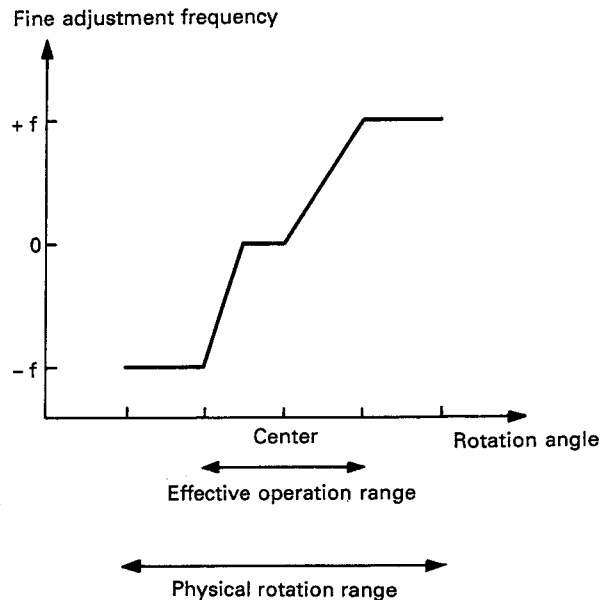


Fig. 10-2

### • Encoder

When the encoder is turned, a pulse having a 90-degree phase shift is input to the CPU. The EN1 pulse is applied to PC3 of pin 20 and INT1 of pin 26. The CPU detects the trailing edge of the waveform via PC3 and the leading edge by INT1 and begins interrupt operation. It checks PC1 of pin 18, judges the rotational direction, counts 1, then performs up/down processing of the frequency and channel data.

Since the encoder is a mechanical device, it produces chattering, but it is designed not to malfunction by software means.

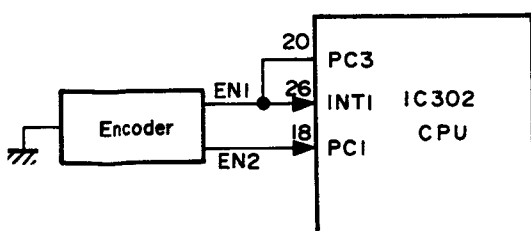


Fig. 11 Encoder circuit

### • Receive signal switching

The MU signal switches the AF signal and the BLK signal switches the RF signal.

When switching from one PLL loop to another an active H-pulse is generated to suppress any noise.

In the TX mode and during memory write operation, the MU signal is output continuously to cut off the audio.

## CIRCUIT DESCRIPTION

### • Squelch control

The CPU inputs the SQL SW status by means of a key scan.

When the SQL SW is off, the SQS signal goes L to

open squelch.

When the SQL SW is on and the VSQ signal is H, the SQS signal goes H to close squelch. If the VSQ signal is L, the SQS signal goes L.

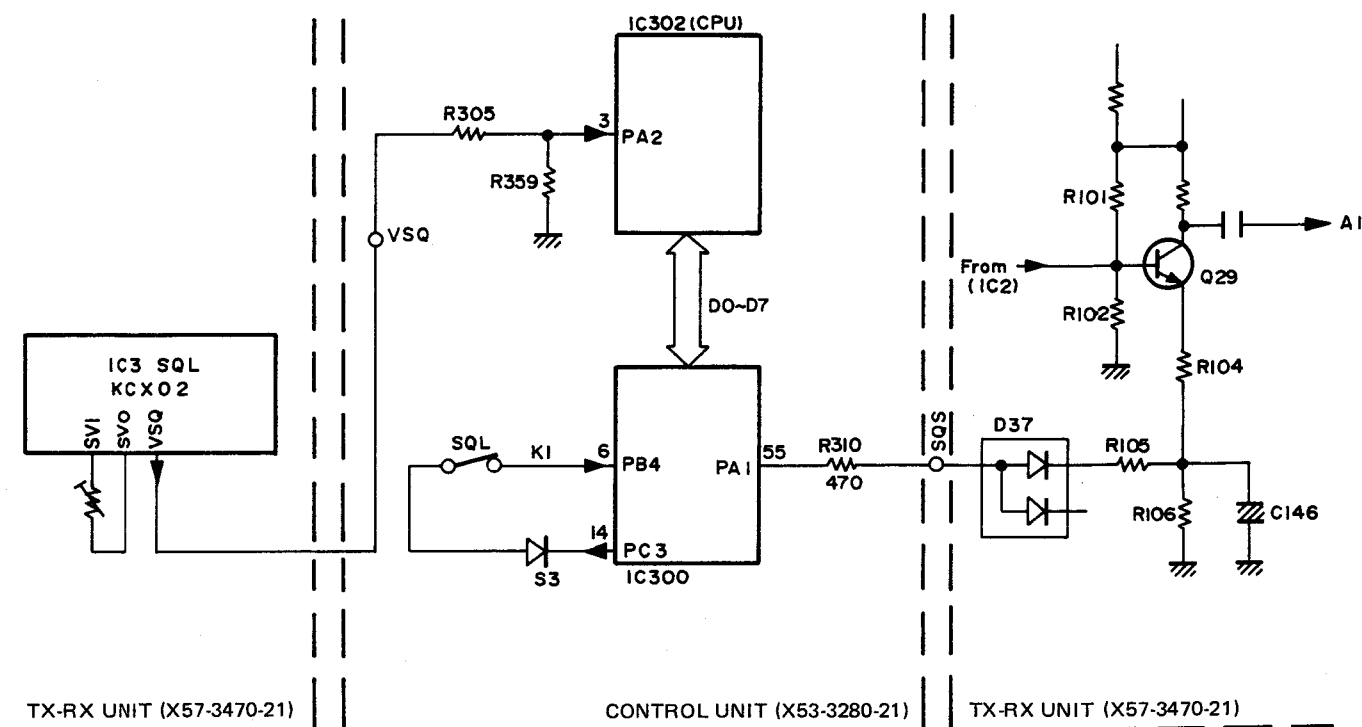


Fig. 12 Squelch control circuit

### • Noise blanker switching

The CPU inputs the NB SW status by key scan.

When the NB SW is pressed, the display changes from OFF to NB1 to NB2 to OFF, and the NB1/NB2 port is controlled as listed in Table 3.

When the display is NB2, both NB1 and NB2 operate.

Display	NB1	NB2
OFF	L	L
NB1	H	L
NB2	H	H

Table 3

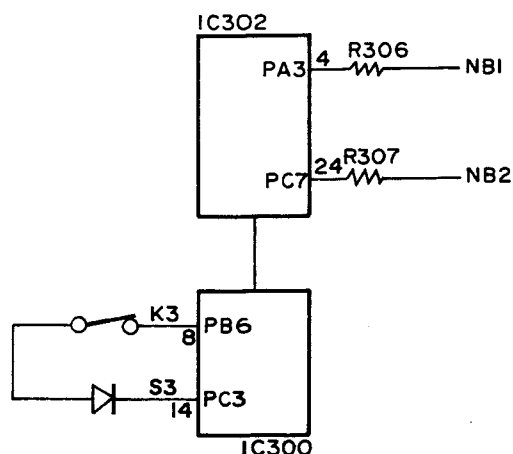


Fig. 13 Noise blanker switching circuit

## CIRCUIT DESCRIPTION

### • Dimmer

Each time the DIMMER SW is pressed, it changes from MAX to MEDIUM to MIN to OFF to MAX. Table 4 lists the PA4 to PA6 outputs.

Brightness	PA6	PA5	PA4
MAX	L	L	H
MED	L	H	L
MIN	H	L	L
OFF	L	L	L

Table 4

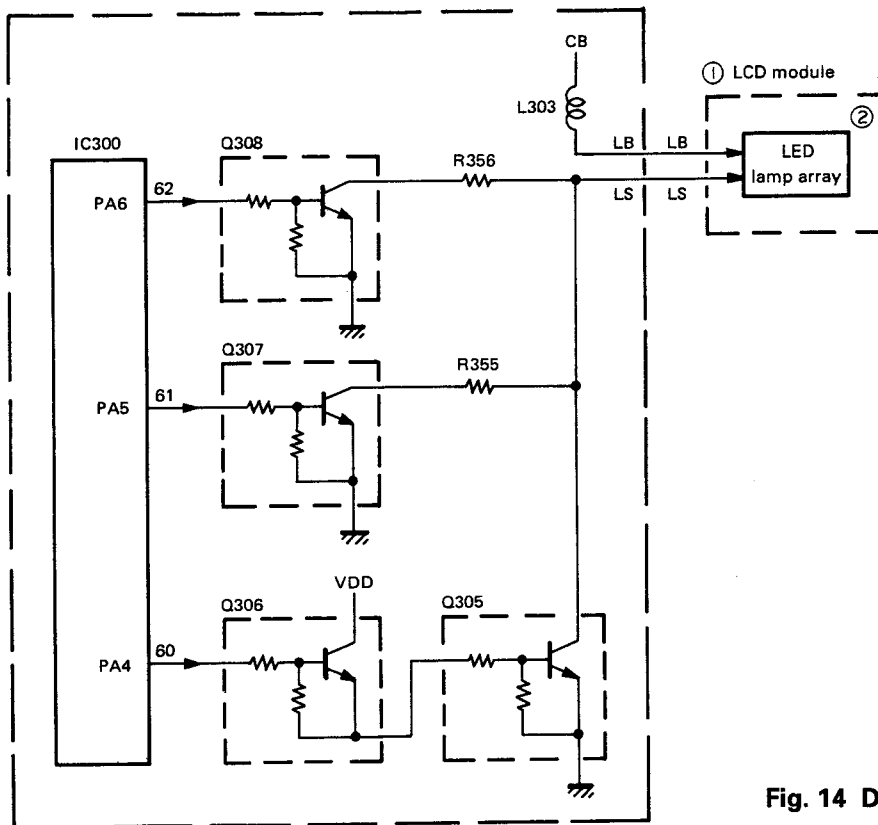


Fig. 14 Dimmer circuit

### • Tone output

The 1500 Hz tone by the TONE SW is output by generating a pseudo sine wave by D/A output and passing it through the LPF. This tone has a step waveform with a 1/11 cycle.

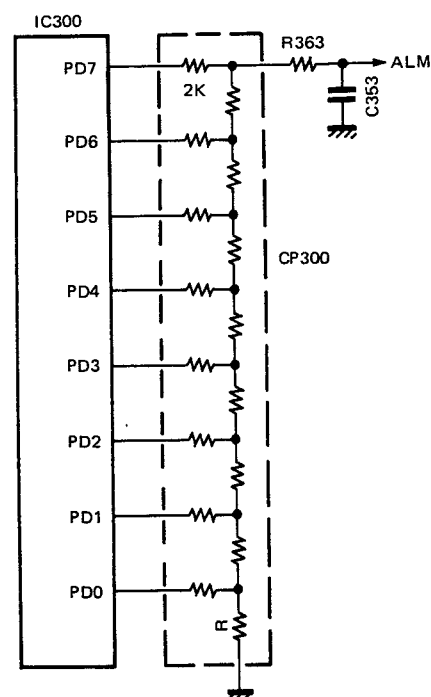


Fig. 15 Tone output circuit

## CIRCUIT DESCRIPTION

## • Terminal functions

## 1) CXD1095Q : Control unit IC300

Port name	Pin No.	Name	I/O	Function/operation
PA0	54	MU	O	AF mute. During memory input.
PA1	55	SQS	O	Squelch control. When squelch is closed.
PA2	56	HRL	O	HS relay control. When the speaker is switched to the external speaker.
PA3	59	TTO	O	Through instruction. When through operation is instructed to AT.
PA4	60	DM2	O	Dimmer control. See page 16.
PA5	61	DM1	O	
PA6	62	DM0	O	
PA7	63		O	Unused.
PB0	64	PTT	I	MIC PTT. When PTT SW is on.
PB1	3		I	Unused.
PB2	4		I	Unused.
PB3	5	K0	I	Key scan output. When SW is pressed.
PB4	6	K1	I	
PB5	7	K2	I	
PB6	8	K3	I	
PB7	9	K4	I	
PC0	11	S0	O	Key scan output. When the key scan strobe pulse output.
PC1	12	S1	O	
PC2	13	S2	O	
PC3	14	S3	O	
PC4	15	S4	O	
PC5	16	S5	O	
PC6	17	S6	O	
PC7	18	S7	O	
PD0	20		O	Tone D/A. When tone is output.
PD1	21		O	
PD2	22		O	
PD3	23		O	
PD4	24		O	
PD5	27		O	
PD6	28		O	
PD7	29		O	
PE0	49	DS	O	Serial data.
PE1	50	CS	O	Serial CK.
PE2	52	ES2	O	Enable.
PE3	53	ES1	O	
Vss	10			GND.
Vss	25			GND.
VDD	26			Power input pin.
D0	30			Bus pin.
D1	31			Bus pin.
D2	32			Bus pin.
D3	35			Bus pin.
D4	36			Bus pin.
D5	37			Bus pin.
D6	38			Bus pin.
D7	39			Bus pin.
CLR	40			Unused. Fixed to H for data write.
ODEON	41			Unused. Fixed to H for data write.
Vss	42			GND.
WR	43			Strobe input for data write.
RD	44			Strobe input for data read.

## CIRCUIT DESCRIPTION

Port name	Pin No.	Name	I/O	Function/Operation
CS	45			Chip select input.
A0	46			Address input for selection of port and control register.
A1	47			Address input for selection of port and control register.
A2	48			Address input for selection of port and control register.
Vss	57			GND.
VDD	58			Power input pin.

2)  $\mu$ PD78C10AG-36 : Control unit IC302

Port name	Pin No.	Name	I/O	Function/Operation
PC0	17	DL	O	Serial data for LCD.
PC1	18	EN2	I	Encoder CK2.
PC2	19	CL	O	Serial CK for LCD.
PC3	20	EN1	I	Encoder CK1.
PC4	21	EL	O	LCD enable.
PC5	22	KEY	I	Key. When marked.
PC6	23	BZ	O	Buzzer.
PC7	24	NB2	O	NB switching. When NB2 operates.
PD0	55	D0	I/O	Bus.
PD1	56	D1	I/O	Bus.
PD2	57	D2	I/O	Bus.
PD3	58	D3	I/O	Bus.
PD4	59	D4	I/O	Bus.
PD5	60	D5	I/O	Bus.
PD6	61	D6	I/O	Bus.
PD7	62	D7	I/O	Bus.
PF0	47	A8	O	Address.
PF1	48	A9	O	Address.
PF2	49	A10	O	Address.
PF3	50	A11	O	Address.
PF4	51	A12	O	Address.
PF5	52	A13	O	Address.
PF6	53	A14	O	Address.
PF7	54	A15	O	Address.
MNI	25		I	Unused.
INT1	26	EN1	I	Encoder CK1.
AN0	34	CL2	I	Clarifier.
AN1	35	M	I	Level meter.
AN2	36	PLSB	I	LSB correction.
AN3	37	PUSB	I	USB correction.
AN4	38	DLY	I	Delay VR.
AN5	39		I	Unused.
AN6	40	UP	I	MIC UP. When SW is on.
AN7	41	DW	I	MIC DOWN. When SW is on.
PA0	1	STT	O	TX 8T switching. In TX mode.
PA1	2	BLK	O	RF mute. When PLL is switched.
PA2	3	VSQ	I	Audio squelch. When an audio signal is present.
PA3	4	NB1	O	NB switching. When NB1 and NB2 operate.
PA4	5	TSO	O	AT tune start.
PA5	6	TTI	I	AT tune end.
PA6	7	V2	O	VCO switching.
PA7	8	V1	O	
PB0	9	EP2	O	PLL IC enable.
PB1	10	EP3	O	
PB2	11	EP1	O	

## CIRCUIT DESCRIPTION

Port name	Pin No.	Name	I/O	Function/Operation
PB3	12	CP	O	Serial CK for PLL IC.
PB4	13	DP	O	Serial data for PLL IC.
PB5	14	STR	O	RX 8R switching. In RX mode.
PB6	15		O	Unused.
PB7	16	TSI	O	AT through response.
MODE 1	27		I	Specify the size of the external memory. Fixed to H level.
RESET	28		I	Reset input. Usually H.
MODE 0	29		I	Specify the size of the external memory. Fixed to H level.
X2	30		I	Crystal connection pin for internal clock generation.
X1	31		I	Crystal connection pin for internal clock generation.
Vss	32		I	GND.
A Vss	33		I	A/D converter GND pin.
VAREF	42		I	A/D converter reference voltage input pin.
A VDD	43		I	A/D converter power pin.
RD	44		O	Strobe signal output for external memory read operation.
WR	45		O	Strobe signal output for external memory write operation.
ALE	46		O	Strobe signal to externally latch the low-order address output to pins PD0 to PD7 to access the external memory.
STOP	63		I	Control input pin in the hardware stop mode.
VDD	64		I	Go L for backup.

### 3) TC9174F : TX-RX unit IC9

Port name	Pin No.	Name	I/O	Function/Operation
OP1	2	B8	O	BPF switching signal.
OP2	3	B7	O	
OP3	4	B6	O	
OP4	5	B5	O	
OP5	6	B4	O	
OP6	7	B3	O	
OP7	8	B2	O	
OP8	9	B1	O	
OP9	10		O	Unused.
OP10	11	TUNE	O	Power control at AT. During tune transmission.

### 4) TC9174F : TX-RX unit IC10

Port name	Pin No.	Name	I/O	Function/Operation
OP1	2		O	Unused.
OP2	3	AM	O	In H3E mode.
OP3	4	CW	O	In CW mode.
OP4	5	ALS	O	Tone mute. When tone is output.
OP5	6	FL3	O	LPF switching signal.
OP6	7	FL2	O	
OP7	8	FL1	O	
OP8	9		O	Unused.
OP9	10	M-POW	O	Power control.
OP10	11	L-POW	O	

## CIRCUIT DESCRIPTION

### Receiving Circuit Configuration

BPF NO.	Frequency (MHz)
B1	0.1~1.5999
B2	1.6~2.9999
B3	3.0~4.9999
B4	5.0~6.9999
B5	7.0~8.9999
B6	9.0~13.9999
B7	14.0~17.9999
B8	18.0~29.9999

**Table 5 Receiving bandpass filter table**

#### • Automatic gain control (AGC) circuit

The output of final-stage intermediate-frequency (IF) amplifier Q15 (3SK131(M)) is amplified by IF hybrid IC2 (KCD03) to produce an AGC voltage with a voltage doubler rectifier. This AGC voltage is fed to a two-stage IF amplifier in IC2 and the second gates of FETs Q12 and Q15 (3SK131(M)) to control the gain.

#### • Squelch circuit

The detected output of IC2 is partially sent to hybrid IC3 (KCX02) and is used as a squelch circuit signal. A high or low digital VSQ signal is output from hybrid IC3, then input to the CPU. The CPU outputs an SQS signal and mutes it using audio frequency (AF) preamplifier Q29 (2SC3324(G)) for squelch control.

#### • Noise blanker (NB) circuit

The input of the NB circuit is extracted from the outputs of second-stage RX mix FETs Q13 and Q14 (2SK520(K44)) and is applied to the NB hybrid IC1 (KCX01). The input signal is amplified and detected by IC1 then output as a noise blanking signal. The operation of IF amplifier Q15 (3SK131(M)) is stopped by NB switching transistor Q16. Noise components are then eliminated.

NB1 is used for short-duration pulses such as ignition noise. NB7 is used for longer-duration, long duration pulse noise such as the woodpecker.

### Transmitting Circuit Configuration

The transmitter utilizes a double-conversion system. An audio signal from the microphone is amplified by microphone amplifiers Q37 and Q38 (2SC3324(G)) and modulated by double-balanced mixer (BM) IC6 ( $\mu$ PC1037A). The modulated output is converted to a DSB signal, passed through 10.695 MHz single-side-band (SSB) filter XF2, then converted to an SSB signal. The SSB signal is then amplified by TX IF amplifier Q45 (3SK131(M)) in the first stage. An ALC voltage is applied to the second gate of Q45 by a dual MOS FET IF amplifier to control the transmitter output.

Audio signals in the H3E mode are also modulated, like an SSB signal, passed through a filter, then amplified by Q45. A carrier signal is added to the amplified signal by a circuit consisting of Q48 and Q49 producing an H3E signal.

The 10.695 MHz signal amplified by Q45 is mixed with a 60.6 MHz signal by second-stage mixer IC7 (SN16913P), then converted to a 71.295 MHz signal. Spurious components in the 71.295 MHz signal are eliminated by a monolithic crystal filter (MCF) (XF1). The resultant signal is amplified by dual gate MOS FET amplifier Q50 (3SK129(L)). When a high SWR is felt at the antenna, the ALC2 voltage at the second gate of Q50 is reduced and the transmitting output level is lowered to protect the transistor in the final stage. The amplified transmitting IF signal is input to a double-balanced mixer consisting of FETs Q51 and Q52 (3SK179(L)), then converted to the desired transmitting frequency. The converted signal is passes through a low-pass filter to eliminate higher harmonic components and is then amplified to the signal level required for a final-stage drive circuit by transistor Q53 (2SC2053).

The drive output is sent to the final-stage unit and amplified to a sufficient output level by wideband pre-drive amplifier Q1 (2SC1971), wideband push-pull drive amplifiers Q2 and Q3 (2SC3133), and wideband push-pull amplifiers Q4 and Q5 (2SC2879(O,Y)) in the final stage.

Predrive amplifier Q1 has a fixed bias and is thermally coupled with diode D1. The bias currents of drive amplifiers Q2 and Q3 and final-stage amplifiers Q4 and Q5 are adjusted by VR1 and VR2. Diode D2 is thermally coupled with Q2, D3 with Q4, and D4 with Q6. Diodes D1 through D4 compensate for the temperature in each stage and prevent thermal runaway.

## CIRCUIT DESCRIPTION

The outputs of Q4 and Q5 in the final stages passes through low-pass filters for each band to eliminate higher harmonic components. The low-pass filter outputs passes through transmit relay K115 and is applied to the antenna terminal. The ALC voltage is detected by L121, and the antenna current is detected by L123.

For bandwidth information, the 3-bit information items (FL1 through FL3) sent from the TX-RX unit are converted to 7 bits by decoder IC101. Q107 through Q113 turn on and relays K101 through K114 are changed over for bandwidth selection. The bandwidth information can be checked by checking that test points LPF1 through LPF7 are high (5 V). The band select relay can also be checked by checking that LPF1B through LPF7B

are 5 V. The table 6 outlines the bandwidth information.

Transmission and reception can be checked when test points TX and RX are 5 V.

FL1	FL2	FL3	LPF NO.	Frequency (MHz)
H	H	H	1	1.6050~2.9999
L	H	H	2	3.0000~4.9999
H	L	H	3	5.0000~6.9999
L	L	H	4	7.0000~8.9999
H	H	L	5	9.0000~13.9999
L	H	L	6	14.0000~17.9999
H	L	L	7	18.0000~27.9999

Table 6 Bandwidth information

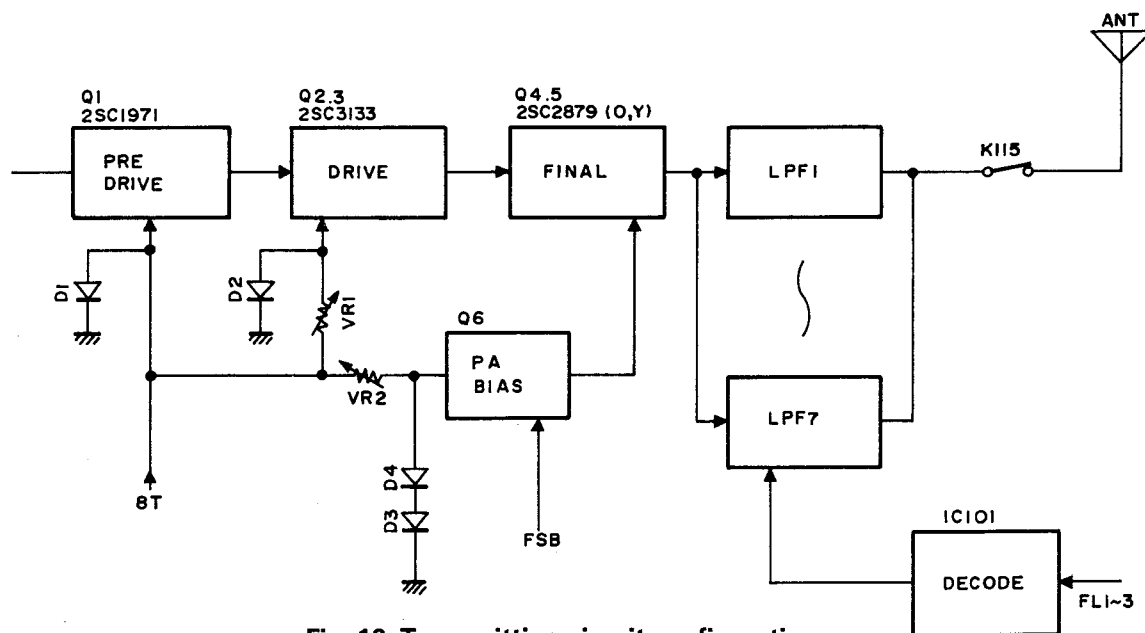


Fig. 16 Transmitting circuit configuration

### • ALC voltage detector and antenna current detector circuits

The ALC voltage is detected by L121. Forward waves are detected by D102, converted to an AC voltage, then sent to the TX-RX unit. The voltage is approximately 10 V in the low- to high-band range with respect to the 47 kΩ load of R112. Reflected waves are detected by D101 and sent to the TX-RX unit. The

reflected waves are adjusted by TC101 so that the VSR voltage is minimum (approximately 0.5 V) when a 4 MHz frequency is output at 110 W.

For antenna current detection, the voltage detected by L123 is detected by D103 and fed to the TX-RX unit. The voltage is approximately 6 V in the low- to high-band range with respect to the 47 kΩ load.

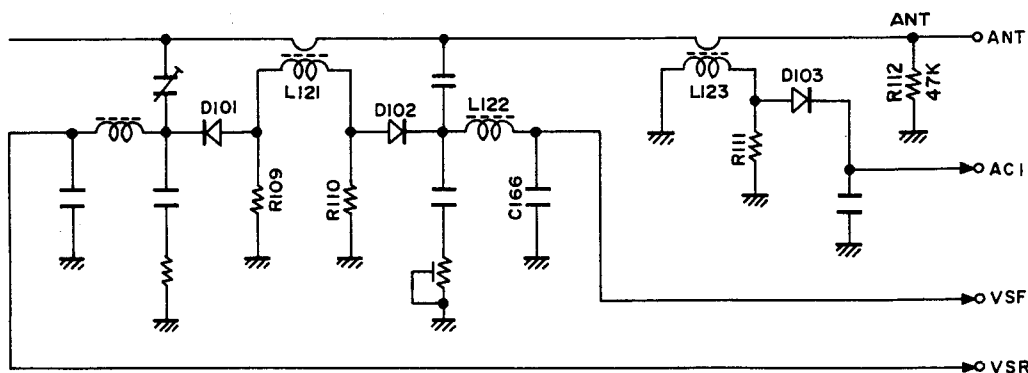


Fig. 17 ALC voltage and antenna current detection



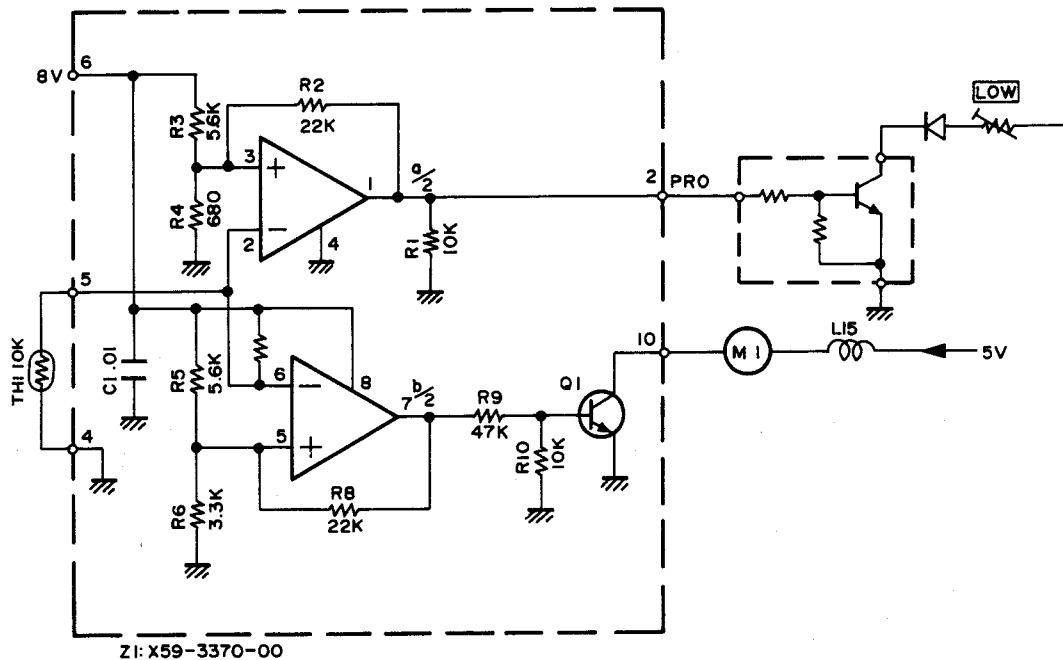
The final stage has a temperature protection circuit consisting of fan module unit Z1 and an overvoltage protection circuit consisting of D6, Q7, and Q8.

- **Temperature protection circuit**

When the heat sink temperature rises and the temperature of thermistor TH1 (10 k $\Omega$ ) exceeds approximately 55 degrees C, comparator IC1 (b/2) of the fan

module (X59-3370-00) is activated, switching transistor Q1 on, and fan motor M1 is driven.

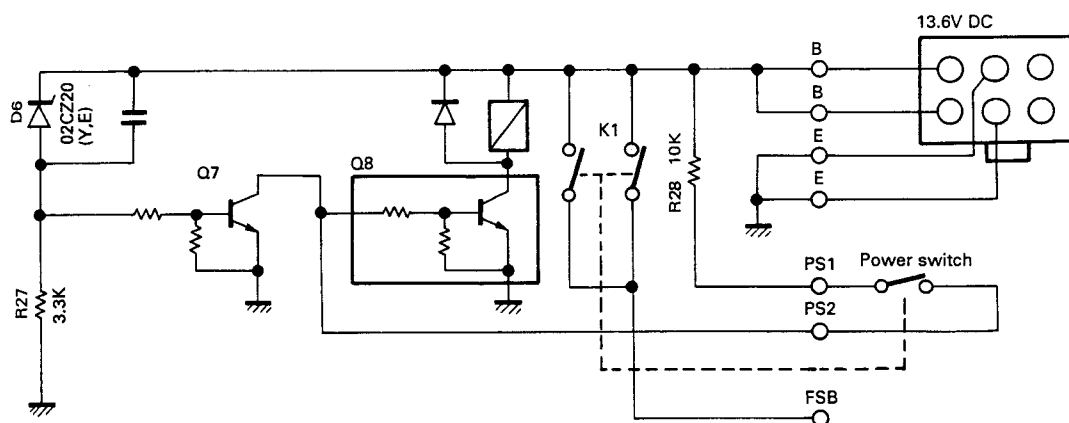
When the heat sink temperature becomes still higher and the thermistor temperature exceeds 90 degrees C, comparator IC1 (a/2) is activated and the output goes high (approximately 7 V). The power select circuit is then activated reducing the output power to approximately 30 W.



**Fig. 18 Temperature protection circuit**

- **Overvoltage protection circuit**

When the supply voltage exceeds approximately 20 V, the base of switching transistor Q7 goes high turning it on; which in turn turns on Q8. As a result, relay K1 connected to the POWER switch is set off and the power is switched off.



**Fig. 19 Overvoltage protection circuit**

CIRCUIT DESCRIPTION

Receiving front end protection circuit

The voltage (8 V) from 8R turns Q104 on, turns Q103 on, (2SA1362(Y)), which then sets receiving select relay K116 on during reception. Therefore, the signal from the ANT terminal is sent to the RA terminal via relay K116.

When a HF signal exceeding approximately 10 W is input to the ANT terminal during reception, forward

waves are detected by D101. This signal level is enough to turn Q106 (2SC2712(Y)) on; which turns Q105 (DTA144) off, then on. Q104 (DTD114EK) then changes from on to off, and Q103 changes from on to off. Thus, receiving select relay K116 is not activated, so the high-frequency power is not fed to the RA terminal to protect the receiving front end.

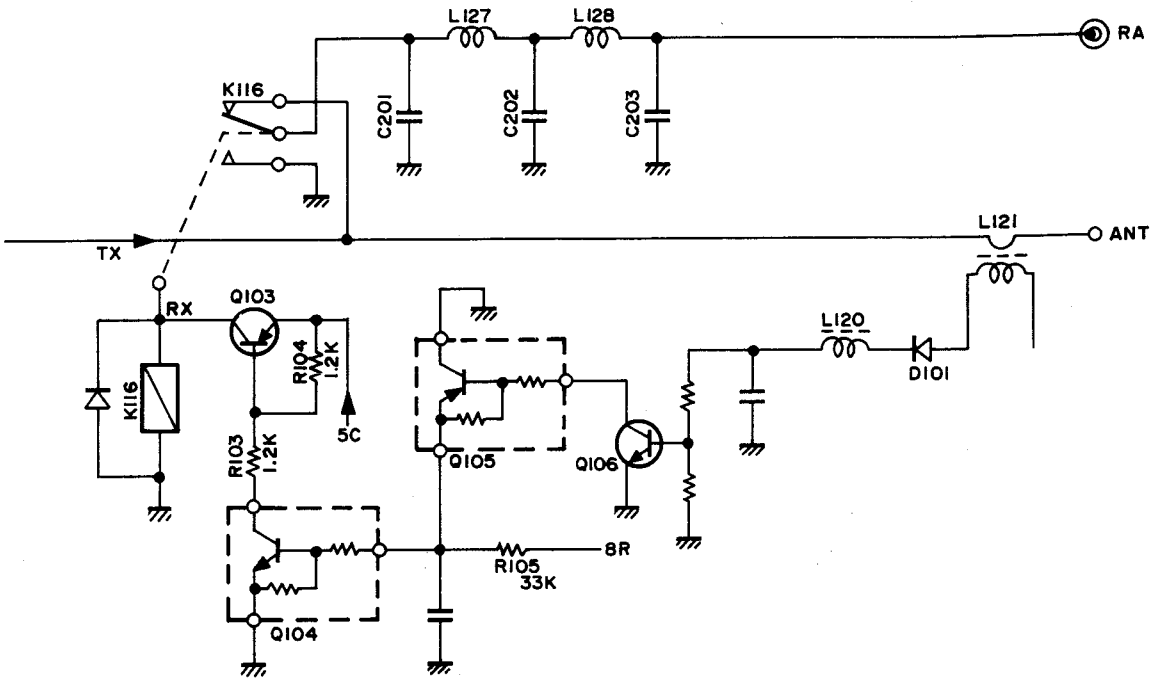


Fig. 20 Receiving front end protection circuit

MIC terminal

See Figure 21 and Table 7.

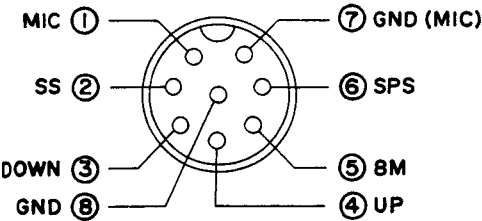


Fig. 21 MIC pin (Viewed from front panel)

Pin No.	Pin Name	Description
①	MIC	MIC impedance approx. 600Ω
②	SS	STANDBY switch.
③	DOWN	Frequency and channel number decrement.
④	UP	Frequency and channel number increment.
⑤	8M	8V (100mA [MAX] ).
⑥	SPS	Receiving audio output.
⑦	GND (MIC)	Ground for MIC.
⑧	GND	Ground.

Table 7 MIC pin description

## CIRCUIT DESCRIPTION

• When using handset instead of microphone

1) Connecting the handset

Connect an 8-pin MIC plug (E07-0852-15) to the handset as shown in Figure 22. Add a resistor (100 k $\Omega$ ) in series to pin 3 (DOWN line). Then, connect the resistor to the off hook switch. Now when the handset is lifted, the off hook circuit is activated. The off hook switch operation is described below. (See Figures 23 and 24.)

The DOWN line is connected to the A/D input terminal of the CPU. The CPU judges whether the A/D input terminal output is a DOWN switch signal or handset off hook switch signal in accordance with the DOWN line level. When the handset off hook switch is detected as being on, the APO signal goes high. Internal and external speaker outputs are then cut off irrespective of the SP switch setting.

2) Using the handset

1. Connect an 8-pin MIC plug to the handset as described above.
2. Insert the connected 8-pin MIC plug into the MIC jack on the front panel.
3. When the handset is placed on a hanger as shown in Figure 23, the received tone is heard from an internal or external speaker (the SP switch is activated). The handset speaker is cut off.
4. When the handset is removed from the hanger as shown in Figure 24, the internal or external speaker is cut off (the SP switch is deactivated). The received tone is heard from the handset speaker.
5. When the PTT switch of the handset is pressed, the set enters the transmission mode.
6. Speak over the handset microphone.
7. When the PTT switch is released the set enters the reception mode.

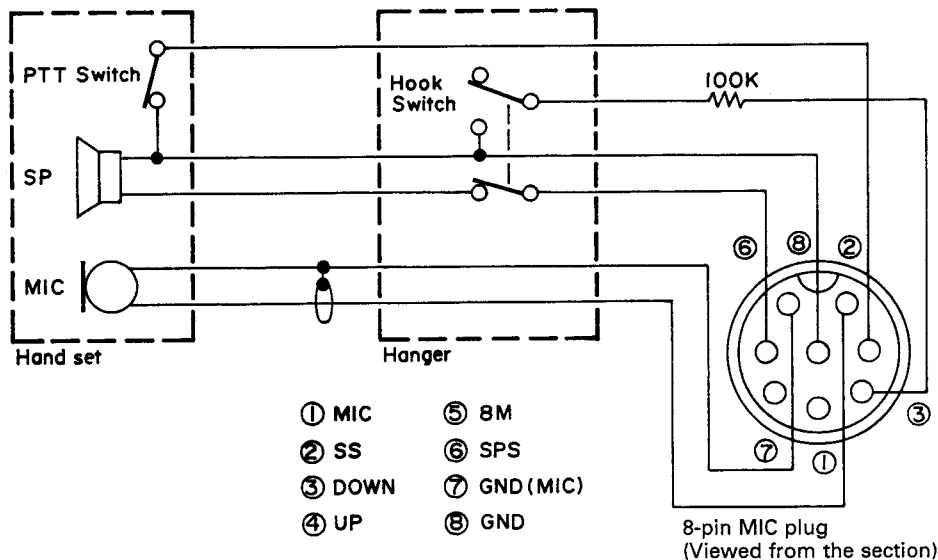


Fig. 22 Handset connection

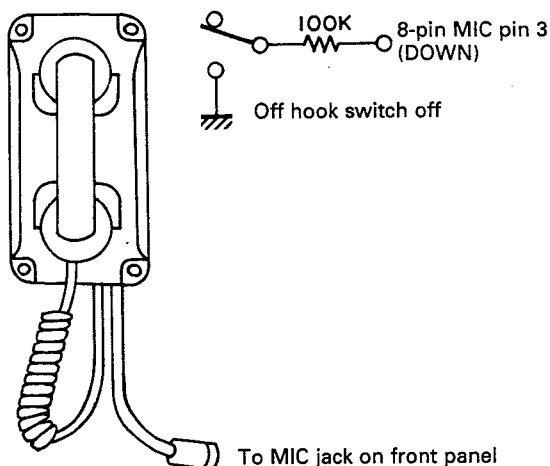


Fig. 23 When placing handset on hanger

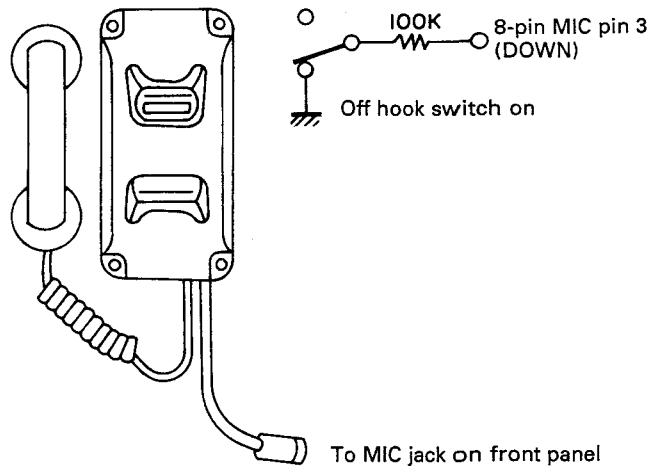


Fig. 24 When removing handset from hanger

## CIRCUIT DESCRIPTION

### Operation Mode

The operation mode consists of user and dealer modes. They differ in specifications for reset and memory channel entry. Memory channel operation will be described first.

#### • User mode

This mode is selected by users. A memory channel cannot be written in the user mode. If functions are set with a DIP switch, a receiving frequency can be written into the memory.

#### • Dealer mode

This mode is used when dealers write the transmitting and receiving frequencies assigned to users into the memory channel. The mode is returned to the user mode to give the set to the user after write is completed.

### Setting of Functions by Diode Removal

As Table 8 outlines, functions can be set with diodes D311 through D313 of the control unit (X53-3280-21).

#### • Function setting

1. Set the POWER switch to OFF.
2. Set the diode corresponding to the desired function.
3. Set the POWER switch to ON.

#### • Description of table 8

The memory channel number appears on the 3-digit display panel (See Figure 25.) When D311 is removed, the memory channel number appears on the 4-digit display panel (See Figure 26.)

When D312 is removed, the dial mode can be set. In the dial mode, the desired frequency can be set with the channel selector. To enter the dial mode, perform the following:

1. Press the C key.
2. Enter 84 from the numeric keypad.
3. Press the ENT key.

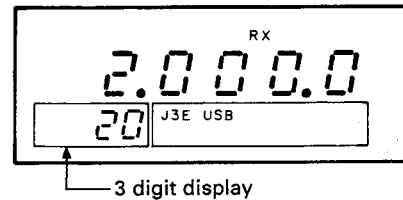
When the POWER switch is set to OFF, the dial mode is canceled. To cancel the dial mode without setting the POWER switch to OFF, perform the following:

1. Press the C key.
2. Enter 85 from the numeric keypad.
3. Press the ENT key.

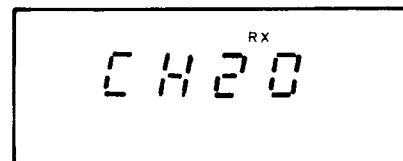
When D313 is removed, a frequency can be sent in the dial mode during the dial mode setting outlined above.

Ref. No.	Function	Diode provided	
		Yes	No
D311	Channel number display	3-digit display	6-digit display
D312	Dial mode	Impossible	Possible
D313	Dial mode sending	Impossible	Possible

**Table 8 Setting of Functions with diodes**



**Fig. 25 Three-digit display**  
(Example : Memory channel number 20)



**Fig. 26 Six-digit display**  
(Example : Memory channel number 20)

### Setting Functions with DIP Switches

As Table 9 outlines, functions can be set with DIP switches S301 of the control unit (X53-3280-21).

#### • Function setting

1. Set the POWER switch to OFF.
2. Set the DIP switch corresponding to the desired function.
3. Set the POWER switch to ON.

#### • Description of table 9

When switch 1 is set to ON, operation is set in the user mode. When it is set to OFF, operation is set in the dealer mode.

When switch 2 is set to ON, a receiving frequency cannot be written in the user mode. When it is set to OFF, a receiving frequency can be written in the user mode.

When switches 3 and 4 are set to ON, the transmitting output level is set to high. When switch 3 is set to ON and switch 4 to OFF, or switch 3 is set to OFF and switch 4 to ON, the transmitting output level is set to medium. When switches 3 and 4 are set to OFF, the transmitting output level is set to low.

## CIRCUIT DESCRIPTION

Table 10 lists the high, medium, and low transmitting output levels.

To adjust the medium transmitting output level, turn VR17 of the TX-RX unit (X57-3470-21). To adjust the low transmitting output level, turn VR18 of the TX-RX unit (X57-3470-21).

Factory settings are as follows:

- Switch 1 : ON
- Switch 2 : ON
- Switch 3 : ON
- Switch 4 : ON

Switch No.	Function	Switch setting			
		ON		OFF	
1	Operation mode	User		Dealer	
2	Receiving frequency write in user mode	Impossible		Possible	
3	Power setting	ON		OFF	
4		ON	OFF	ON	OFF
		HI	MEDIUM	MEDIUM	LOW

**Table 9 Setting of functions with DIP switches**

Wave type	Transmitting output level		
	HIGH	MEDIUM	LOW
J3E	Approx 150 pep	Approx 75W pep	Approx 35W pep
CW	Approx 100W	Approx 60W	Approx 30W
H3E	Approx 45W	Approx 25W	Approx 12W

**Table 10 Transmitting output level setting**

### Reset

#### • How to reset

- Set the POWER switch to OFF.
- Set the POWER switch to ON while pressing the keys listed in Table 11.

#### • Description of Table 11

When the system is reset, a memory 1 channel is set. The memory is described below.

When the system is reset in dealer mode with the C key, all memory channels are cleared. The initial mode is then entered.

When the system is reset in the dealer and user modes with the ENT key, the memory remains backed up. The initial mode is then entered.

When the system is reset in the user mode with the C key, the receiving frequency memory written in the user mode is cleared. The memory channel written in the dealer mode remains backed up. The initial mode is then entered.

Operation mode	Key used	Write data	
		User write channel	Dealer write channel
Dealer mode	ENT	Back up	Back up
	C/F	Cleared	Cleared
User mode	ENT	Back up	Back up
	C/F	Cleared	Back up

**Table 11 Reset**

### Memory

#### • Microprocessor memory backup

An EEPROM is contained in the Radio telephone to retain memory. Turning off the POWER switch, or a power failure will not erase the memory.

A lithium battery is installed to back up the display before turning off the POWER switch. The lithium battery should last for approximately five years.

When the battery discharges, an initialized display may appear in the display.

Lithium battery replacement should be performed by an authorized KENWOOD service facility; either your KENWOOD dealer.

#### • Memory channel

This set has 99 memory channels. The data items that can be memorized in the memory channels are as follows:

- Receiving frequency
- Transmitting frequency
- Mode

#### • Before memory write

Reset the system as follows before writing the memory:

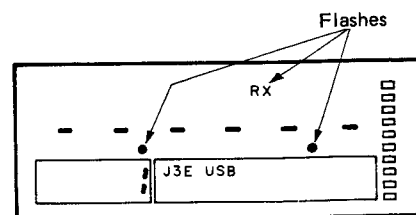
- Set the set in the dealer mode.
- Set the POWER switch to ON while pressing the C key.

#### • Memory write

Write the memory as follows:

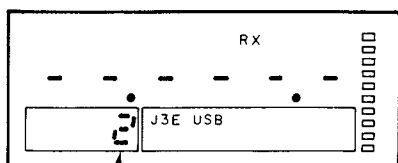
(Write the memory while the set is in dealer mode.)

- Press the ENT key to enter the memory entry mode. A vacant channel display is shown below.



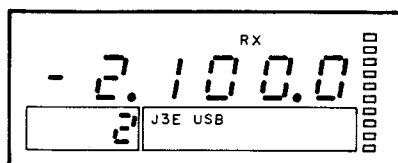
## CIRCUIT DESCRIPTION

2. Rotate the channel selector to select the desired memory channel.

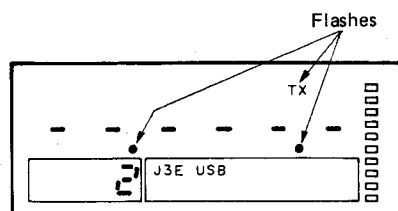


Rotate the channel selector until the desired memory channel appears.

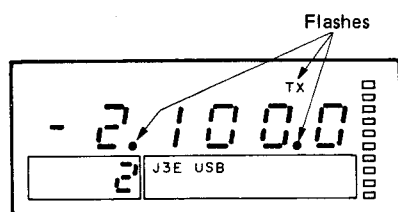
3. Enter a receiving frequency from the high-order digit from the numeric keypad.



4. Press the MOD key to select the desired emission mode.
5. Press the ENT key to store the RX data into the selected memory channel.
6. The display panel is shown below.



7. When a transmitting frequency is not written into the memory, press the C key.  
To write a transmitting frequency into the memory, follow the procedure below.
8. Enter the transmitting frequency from the high-order digit from the numeric keypad.



9. Press the ENT key.

### • To release the memory entry mode

Before completing the operation, press the C key, or PTT switch (no transmit will occur at this time).

### • To correct errors during keyboard entry

Continue to press the numeric key until all digits appear then re-enter the desired number.

### • Memory correction

To correct the memory, follows the procedure below.

#### 1. Memory deletion

1. Press the ENT key to select the memory entry mode.
2. Press the 0 key.
3. Press the ENT key to delete the memory.

#### 2. Memory overwrite

When a memory is overwritten into the previously written memory, it is rewritten.

### • Memory channel number display selection

Select whether the memory channel number is displayed on the 3-or 6-digit display panel. (See Setting of Functions by Diode Removal.)

### • The dial mode can be set

(See Setting of Functions by Diode Removal.)

### • A frequency can be sent in the dial mode

(See Setting of Functions by Diode Removal.)

### • A receiving frequency can be written in the user mode

(See Setting of Functions with DIP Switches.)

### • Transmitting output level selection

See Setting of Functions with DIP Switches.

### • After memory write

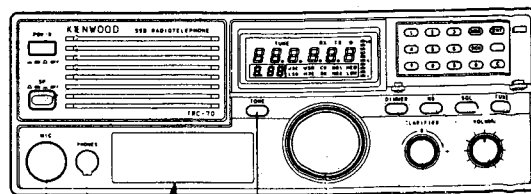
After memory write is completed, set the set in the user mode. The memory written in the dealer mode cannot be rewritten.

### • Channel seal

Write a memory channel comment (e.g., frequency) into the channel seal (See Figure 27.) Attach it to the lower left position of the front panel (See Figure 28.)

1	2182.0	7	
2	5000.0	8	
3	10000.0	9	
4	15000.0	10	

Fig. 27 Channel seal (EX.)



Channel seal

Fig. 28 Channel seal attachment

## DESCRIPTION OF COMPONENTS

## FINAL UNIT (X45-3370-21)

Component	Use/Function	Operation/Condition/Compatibility
IC1	8V AVR	Input 13.6V, output 8V.
IC2	5V AVR	Input 13.6V, output 5V.
IC101	Band data decode	See to circuit description.
Q1	Pre drive amplifier	Wide freq. amplifier.
Q2, 3	Drive amplifier	Pushpull amplifier.
Q4, 5	Final amplifier	Pushpull amplifier.
Q6	Bias voltage supply to Q4, 5.	Current amplifier when transmit.
Q7	Over voltage detection	Turn on when voltage (approx. 20V or more).
Q8	Power switch relay control	On when power switch is turned on.
Q101, 102	TX/RX select relay switch	Turn ON when transmit (TX terminal : 5V).
Q103, 104	TX/RX select relay switch	Turn ON when receive (RX terminal : 5V).
Q105	RX protection circuit switch	Turn ON when operate to protection circuit (Normally OFF).
Q106	RX protection circuit detection	
Q107	LPF select relay switch	Turn ON 5~6.9999MHz (LPF3B terminal : 5V).
Q108	LPF select relay switch	Turn ON 18~29.9999MHz (LPF7B terminal : 5V).
Q109	LPF select relay switch	Turn ON 9~13.9999MHz (LPF5B terminal : 5V).
Q110	LPF select relay switch	Turn ON 7~8.9999MHz (LPF4B terminal : 5V).
Q111	LPF select relay switch	Turn ON 14~17.9999MHz (LPF6B terminal : 5V).
Q112	LPF select relay switch	Turn ON ~2.9999MHz (LPF1B terminal : 5V).
Q113	LPF select relay switch	Turn ON 3~4.9999MHz (LPF2B terminal : 5V).
Q114	LPF select relay switch	Turn ON 14~17.9999MHz (LPF6 terminal : 5V).
Q115	LPF select relay switch	Turn ON 18~29.9999MHz (LPF7 terminal : 5V).
Q116	LPF select relay switch	Turn ON ~2.9999MHz (LPF1 terminal : 5V).
Q117	LPF select relay switch	Turn ON 3~4.9999MHz (LPF2 terminal : 5V).
Q118	LPF select relay switch	Turn ON 9~13.9999MHz (LPF5 terminal : 5V).
Q119	LPF select relay switch	Turn ON 5~6.9999MHz (LPF3 terminal : 5V).
Q120	LPF select relay switch	Turn ON 7~8.9999MHz (LPF4 terminal : 5V).
D1	Temperature compensation of Q1 bias current	Temperature compensation of pre drive transistor Q1.
D2	Temperature compensation of Q2, 3 bias current	Temperature compensation of drive transistor Q2.
D3	Temperature compensation of Q4, 5 bias current	Temperature compensation of final transistor Q4.
D4	Q6 temperature compensation	Temperature compensation of final bias transistor Q6.
D5	Power supply reverse current protection	Power voltage supply.
D6	AVR	Over voltage protection.
D7	Surge absorb for relay	Relay for power switch.
D8	Surge absorb for motor	Fan motor.
D101	Reflection wave rectifier	RF rectifier.
D102	Forward wave rectifier	RF rectifier.
D103	Antenna current rectifier	RF rectifier.
D104	Lightning surge protection	Surge absorb to ANT terminal.
D105	Surge absorb for relay	For transmit relay.
D106	Surge absorb for relay	For receive relay.
D107	Surge absorb for relay	5~6.9999MHz. LPF relay.
D108	Surge absorb for relay	18~29.9999MHz. LPF relay.
D109	Surge absorb for relay	9~13.9999MHz. LPF relay.
D110	Surge absorb for relay	7~8.9999MHz. LPF relay.
D111	Surge absorb for relay	14~17.9999MHz. LPF relay.
D112	Surge absorb for relay	0.1000~2.9999MHz. LPF relay.
D113	Surge absorb for relay	3~4.9999MHz. LPF relay.
TH1	Temperature protection detection	Approx 55°C when fan motor operates. Approx 45°C when fan motor stopped. Approx 90°C when RF power dropped. Approx 80°C when RF power recovered.

## DESCRIPTION OF COMPONENTS

## CONTROL UNIT (X53-3280-21)

Component	Use/Function	Operation/Condition/Compatibility																																				
IC1	5V AVR	Input 8V, output 5V.																																				
IC2	Divided 1/3	5 : Output 10.1MHz    10 : Input 30.3MHz																																				
IC3	A loop PLL IC	5 : Ref. input 10.1MHz    7 : VCO locked voltage output. 8 : "H" when unlocked    11 : VCO input 40.72~70.62MHz.																																				
IC4	VCO select decoder	<table><tr><th colspan="2">Control data</th><th colspan="4">VCO switching</th></tr><tr><th>V1</th><th>V2</th><th>VCO1</th><th>VCO2</th><th>VCO3</th><th>VCO4</th></tr><tr><td>L</td><td>L</td><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td></tr><tr><td>H</td><td>L</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>L</td><td>H</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>H</td><td>H</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td></tr></table>	Control data		VCO switching				V1	V2	VCO1	VCO2	VCO3	VCO4	L	L	ON	OFF	OFF	OFF	H	L	OFF	ON	OFF	OFF	L	H	OFF	OFF	ON	OFF	H	H	OFF	OFF	OFF	ON
Control data		VCO switching																																				
V1	V2	VCO1	VCO2	VCO3	VCO4																																	
L	L	ON	OFF	OFF	OFF																																	
H	L	OFF	ON	OFF	OFF																																	
L	H	OFF	OFF	ON	OFF																																	
H	H	OFF	OFF	OFF	ON																																	
IC5	A loop MIXER	5 : Input 71.395~101.295MHz    11 : Input 30.675~30.695MHz 13 : Output 40.72~70.62MHz																																				
IC6	B loop PLL IC	5 : Ref. input 10.1MHz    7 : VCO lock voltage output    8 : "H" when unlocked. 13 : VCO input 37.5~39.5MHz																																				
IC7	Divided 1/100	4 : Input 37.5~39.5MHz    8 : Output 375~395kHz																																				
IC8	MIXER	1 : Output 30.675~30.695MHz    2 : Input 30.3MHz    5 : Input 375~395kHz																																				
IC9	C loop PLL IC	5 : Ref. input 10.1MHz    7 : VCO lock voltage output    8 : "H" when unlocked 11 : VCO input 59.3~59.7MHz																																				
IC10	Divided 1/100	4 : Input 59.3~59.7MHz    8 : Output 593~597kHz																																				
IC11	MIXER	1 : Output 10.693~10.697MHz    2 : Input 10.1MHz    5 : Input 593~597kHz																																				
IC300	I/O Expander																																					
IC301	5V AVR	Input 13.6V (CB line), output 5V.																																				
IC302	CPU	8bit microprocessor																																				
IC303	Address latch	Latched an address signal for multiplex bus.																																				
IC304	Address decoder	Chip select signal occur.																																				
IC305	System reset	Watch a 13.8V voltage, reset signal occur to CPU.																																				
IC306	System reset wave form																																					
IC307	Inverter	Inverted reset signal.																																				
IC308	OR gate	Make a logic that can not be memory writing when reset operation.																																				
IC310	EPROM	Memorized program.																																				
IC311	EEPROM	Keep to memory channel data.																																				
IC312	Back-up signal wave form																																					
Q1	Ref. buffer amplifier	30.3MHz.																																				
Q2, 3	Ref. amplifier	30.3MHz.																																				
Q4	Ref. buffer amplifier	10.1MHz.																																				
Q5~7	A loop active filter																																					
Q8	HET amplifier	71.395~101.295MHz.																																				
Q9	Buffer amplifier	71.395~101.295MHz.																																				
Q10, 11	A loop PLL IF amplifier	40.72~70.62MHz.																																				
Q12, 13	A loop B.P.F select switch	ON A loop operative to VCO3 or VCO4.																																				
Q14	A loop B.P.F select switch	ON A loop operative to VCO1 or VCO2.																																				
Q15~17	B loop active filter																																					
Q18	Buffer amplifier	30.3MHz.																																				
Q19~21	Unlock switching	ON when unlocked. Normaly OFF.																																				
Q22~24	C loop active filter																																					
Q25	Buffer amplifier	10.1MHz.																																				
Q26	Carrier output switching	OFF when H3E received.																																				
Q27	CAR amplifier	10.693~10.697MHz.																																				
Q28	CAR output amplifier switching	ON when unlocked.																																				
Q29	LED indicator switch	ON when unlocked.																																				
Q300	Tuning start indication switch	ON when tuning start. Normaly OFF.																																				
Q301	Tuning finished response switch	ON when tuning finished. Normaly OFF.																																				
Q302	Tuning through indication switch	ON when tuning through. Normaly OFF.																																				



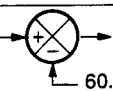
## DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q303	Tuning through response switch	ON when tuning through. Normally OFF.
Q304	STBY switch	ON in transmit. OFF in received.
Q305, 306	Dimmer switch	ON : 'H'.
Q307	Dimmer switch	ON : 'MED'.
Q308	Dimmer switch	ON : LOW.
Q309	LB AVR protection	LB AVR. Output approx 10.5V.
Q310	LB AVR protection	ON when LB AVR output is shorted.
Q311	KEY switch	MARK : ON SPACE : OFF.
Q312	Back-up switch	ON when back-up mode. Normally OFF.
D1	Reverse current protection	
D2, 3	A loop B.P.F select switch	ON when operative to A loop VCO1 or VCO2.
D4, 5	A loop B.P.F select switch	ON when operative to A loop VCO3 or VCO4.
D6	Reverse current protection	
D7	B loop VCO vari-cap	
D8	Reverse current protection	
D9	C loop VCO vari-cap	
D301	LB AVR ref.	
D302~306	Reverse current protection	RF feed back of another circuit when using scan signal.
D307	CPU input port protection	
D308	Voltage detection for back-up	
D309	IC312 port protection	
D310	Reverse current protection	Charge protection of the lithium battery when normal operation.
D311~313	Function setting	See to circuit description.
D315	Discharge value select	Occur to reset signal quickly when power supply is turned OFF.
D316	Level shift	IC301 output calibration.
D317	Reverse current protection	Protect for back-up current that draw to unwanted circuit.

## TX-RX UNIT (X57-3470-10)

Component	Use/Function	Operation/Condition/Compatibility
IC1	Noise blanker	
IC2	IF	10.695MHz IF 2nd stage. SSB, AM detection with AGC amplifier.
IC3	Squelch	
IC4(1/2)	S-meter amplifier	
IC5	Audio power amplifier	
IC6	Transmit balanced modulator	5 : MIC input 3 : Output 7 : Carrier input
IC7	Transmit 1st mixer	1 : Output 71.295MHz 2 : Local input 60.6MHz 5 : IF input 10.695MHz
IC8(1/2)	ALC amplifier	Controlled ALC voltage by FWD voltage.
IC8(2/2)	ALC amplifier	Protect for Q50 G2 voltage dropped when abnormal.
IC9	Receive B.P.F select	Converted to parallel data from serial data.
IC10	Select	MODE, RF power select. Converted to parallel data from serial data of L.P.F information.
IC11	8V AVR	Input SB line output 8V.
Q1	BPF8 switching	Turn ON when received 18.0000~30.0000MHz.
Q2	BPF7 switching	Turn ON when received 14.0000~17.9999MHz.
Q3	BPF6 switching	Turn ON when received 9.0000~13.9999MHz.
Q4	BPF5 switching	Turn ON when received 7.0000~8.9999MHz.
Q5	BPF4 switching	Turn ON when received 5.0000~6.9999MHz.
Q6	BPF3 switching	Turn ON when received 3.0000~4.9999MHz.
Q7	BPF2 switching	Turn ON when received 1.6000~2.9999MHz.
Q8	BPF1 switching	Turn ON when received 0.1~1.5999MHz.
Q9, 10	Receive 1st mixer	
Q11	1st mixer switching	Turn ON in received.
Q12	1st IF amplifier	71.295MHz.

## DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q13, 14	Receive 2nd mixer	
Q15	2nd IF amplifier	10.695MHz.
Q16	2nd IF amplifier switching	Normally turn ON. Turn OFF when, NB GATE is LOW, BLK is HI.
Q17	2nd IF amplifier switching	Turn ON when BLK is "H".
Q18	NB1 switching	Turn ON when NB1 operates.
Q19	NB2 switching	Turn ON when NB2 operates.
Q20	H3E receive +B voltage switching	Turn ON when H3E received (8V).
Q21	H3E receive +B voltage switching	Turn ON when H3E received.
Q24	Filter switching	
Q25	AMB switching	Turn ON when H3E mode.
Q26	SCB switching	Turn OFF when H3E mode normaly 8V.
Q27	H3E DET switching	Turn OFF when H3E mode.
Q28	AGC switching	Turn ON when H3E mode.
Q29	AF pre-amplifier	
Q30	Mute switching	ON in mute squelch is turned on. Normaly OFF.
Q31	Tone switching	OFF in tone is turned on. Normaly on.
Q32	Tone switching	ON in tone is turned on.
Q33	Tone switching	
Q34	Tone amplifier	
Q35	Internal speaker switching	ON when internal speaker is turned OFF.
Q36	RELAY switching	Turn ON when transmit.
Q37, 38	Mic amplifier	
Q39	Mic switching	ON when tone operation.
Q40	Mic amplifier mute	Turn ON when CW mode (8V).
Q44	CAR switching	Turn ON when received.
Q45	Transmit IF amplifier	10.695MHz.
Q46	Transmit IF amplifier switch	Turn OFF when CW mode.
Q47	Transmit IF amplifier switch	Turn ON when transmit (8V). Occur to keying timing.
Q48	H3E CAR switching	Turn ON when H3E transmisstion.
Q49	CAR amplifier	H3E carrier. 60.6MHz.
Q50	Transmit IF amplifer	71.295MHz.
Q51, 52	Transmit 2nd mixer	71.295MHz → Transmit freq.
Q53	Transmit RF amplifier	
Q54	HET amplifier	71.395~101.295MHz.
Q55	REF buffer amplifier	30.3MHz.
Q56	Doubler	30.3 X 2=60.6MHz.
Q57	2nd HET amplifier	60.6MHz.
Q58	Temperature protection switch	Turn ON temperature protection operation. Normaly OFF.
Q59	Reflection ALC amplifier	
Q60	8R switching	Turn ON when receive (8V).
Q64	8R switching	Turn ON when receive.
Q65	8R switching	Turn OFF when receive.
Q66	8T switching	Turn ON when transmit (8V).
Q67	8T switching	Turn ON when transmit.
Q68	8T switching	Turn OFF when transmit.
Q90	Ref. crystal oscillator	30.3MHz.
Q91	OSC buffer	30.3MHz.
D1~4	Front-end protection	
D5, 6	BPF8 switching	Turn ON when received 18.0000~30.0000MHz.
D7, 8	BPF7 switching	Turn ON when received 14.0000~17.9999MHz.
D9, 10	BPF6 switching	Tuen ON when received 9.0000~13.9999MHz.
D11, 12	BPF5 switching	Turn ON when received 7.0000~8.9999MHz.
D13, 14	BPF4 switching	Turn ON when received 5.0000~6.9999MHz.
D15, 16	BPF3 switching	Turn ON when received 3.0000~4.9999MHz.

## DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Conpatibility
D17, 18	BPF2 switching	Turn ON when received 1.6000~2.9999MHz.
D19, 20	BPF1 switching	Turn ON when received 0.1~1.5999MHz.
D21, 22	Voltage shift	NB1, NB2 switch.
D24, 25	MCF switching	Select between receive & transmit.
D26, 33	Crystal filter switching	Select between receive & transmit.
D27~30	Crystal filter switching	Select between J3E CW mode & H3E.
D31~35	Reverse current protection	
D36	Switching	S-meter time-constant select.
D37	Reverse current protection	SQL.
D38		MUTE.
D39	Surge voltage absorb for relay.	Speaker relay.
D40, 44	Reverse current protection	KEY.
D45	Reverse current protection	EXT ALC.
D46	ALC protection	EXT ALC.
D47	Relay terminal protection	
D48~51	Reverse current protection	MIC terminal (8V line).
D52	Crystal filter switching	
D53, 54	CAR switching	Turn ON when, carrier into BM.
D55	Reverse current protection	CW.
D56	TIF switching	TX 1st IF output.
D57	Reverse current protection	8T.
D58	Reverse current protection	
D59, 60	H3E CAR switching	Turn ON when H3E transmit. H3E CAR amplifier input.
D64~66	H3E CAR switching	Turn ON when H3E transmit. H3E CAR amplifier output.
D67	1st local switching	TX-RX switching.
D68	2nd local switching	
D69	Reverse current protection	LOW PWR ALC1, 2.
D70	Reverse current protection	MED PWR ALC1, 2.
D71, 72	Reverse current protection	
D73	Voltage regulator	For DC-DC converter.
D74	Voltage regulator	Voltage supply for IC9, 10 (5V).
D75	Reverse current protection	S-meter, antenna current.

## VCO (X58-3720-10) CONTROL UNIT

Component	Use/Function	Operation/Condition/Conpatibility
Q1	VCO1	71.395~78.295MHz.
Q2	VCO1 switching	Turn ON when VCO1 operates.
Q3	VCO2	78.295~85.295MHz.
Q4	VCO2 switching	Turn ON when VCO2 operates.
Q5	VCO3	85.295~93.295MHz.
Q6	VCO3 switching	Turn ON when VCO3 operates.
Q7	VCO4	93.295~101.295MHz.
Q8	VCO4 switching	Turn ON when VCO4 operates.
Q9	VCO buffer amplifier	71.395~101.295MHz.
D1	VCO1 vari-cap	
D2	VCO1 switching	Turn ON when VCO1 operates.
D3	VCO2 vari-cap	
D4	VCO2 switching	Turn ON when VCO2 operates.
D5	VCO3 vari-cap	
D6	VCO3 switching	Turn ON when VCO3 operates.
D7	VCO4 vari-cap	
D8	VCO4 switching	Turn ON when VCO4 operates.

## DESCRIPTION OF COMPONENTS

### SIDE TONE (X59-1060-00) TX-RX UNIT

Component	Use/Function	Operation/Condition/Conpatibility
Q1	SIDE TONE oscillation	800Hz.
D1	Switching	Turned ON when KEY DOWN.
D2	Prevention of reverse current	
D3	Temperature compensation	

### DC-DC (X59-1110-00) TX-RX UNIT

Component	Use/Function	Operation/Condition/Conpatibility
Q1	Multi-vibrator	Supplies approx. 19kHz square wave.
Q2	Multi-vibrator	
D1	Voltage multiplying current	

### FAN & TEMP PRO (X59-3370-00) FINAL UNIT

Component	Use/Function	Operation/Condition/Compatibility
IC1(1/2)	Temperature protection	"H" level : 7V, temperature of heatsink increase over 90°C.
IC1(2/2)		"H" level : 7V, temperature of heatsink increase over 55°C.
Q1	Switching	Turn ON when IC1(2/2) operates fan starter.

### VCO (X59-3440-00) CONTROL UNIT

Component	Use/Function	Operation/Condition/Conpatibility
Q1	VCO	30~110MHz.
Q2	VCO buffer	

## PARTS LIST

## CAPACITORS

CC 45 TH 1H 220 J  
1 2 3 4 5 6

CC45

Color\*

## • Capacitor value

1 0 3 = 0.01 $\mu$ F

- 1 = Type ..... ceramic, electrolytic, etc.  
2 = Shape ..... round, square, etc.  
3 = Temp. coefficient  
4 = Voltage rating  
5 = Value  
6 = Tolerance

## • Temperature Coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	± 30	± 60	± 120	± 250	± 500

Example CC45TH = -470 ± 60 ppm/°C

## • Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40 - 20	+ 80 - 20	+ 100 - 0	10 $\mu$ F-10~+50 4.7 $\mu$ F-10~+75

Less than 10 pF

## • Rating voltage

2nd word 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	—
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	—
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	—

## • Chip capacitors

(EX) CC 7 3 F SL 1 H 0 0 0 J  
1 2 3 4 5 6 7  
(Chip) (CH, RH, UJ, SL)  
(EX) CK 7 3 F F 1 H 0 0 0 Z  
1 2 3 4 5 6 7  
(Chip) (B, F)

→ Refer to the table above.

## RESISTORS

## • Chip resistor (Carbon)

(EX) R 0 7 3 E 8 2 B 0 0 0 J  
1 2 3 4 5 6 7  
(Chip) (B, F)

## • Carbon resistor (Normal type)

R 0 1 4 B 8 2 C 0 0 0 J  
1 2 3 4 5 6 7

- 1 = Type ..... ceramic, electrolytic, etc.  
2 = Shape ..... round, square, etc.  
3 = Dimension  
4 = Temp. coefficient  
5 = Voltage rating  
6 = Value  
7 = Tolerance.

## Dimension

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

## Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

## Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1/10W	2E	1/4W	3A	1W
2B	1/8W	2H	1/2W	3D	2W
2C	1/6W				

## Dimension



## PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

### RADIOTELEPHONE

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
<b>TRC-70</b>						
1	1B	*	A01-1087-02	METALLIC CABINET		
2	3B	*	A01-1089-02	METALLIC CABINET		
-		*	A20-7044-03	PANEL		
5	2A	*	A20-7046-13	PANEL ASSY		
6	2A		A20-7061-04	PANEL ASSY (DRESSING PANEL)		
-			A21-1536-04	DRESSING PANEL		
9	1D	*	A23-1519-03	REAR PANEL (TOP)		
10	2D	*	A23-1521-03	REAR PANEL (BOTTOM)		
12	2A		B10-1129-14	FRONT GLASS		
-		*	B40-7610-04	MODEL NAME PLATE		
15	2A	*	B42-3379-04	LABEL (PANEL)		
17	2B		B42-3381-04	LABEL (HEAT SINK)		
-		*	B42-3382-04	LABEL (CH SHEET)		
-		*	B50-8322-00	INSTRUCTION MANUAL		
-			E12-0001-15	PHONE PLUG (ACSY)		
-			E30-2194-05	DC POWER CORD		
-			E31-3303-05	CONNECTING WIRE (REF)		
-			E31-6115-05	CONNECTING WIRE (25P)		
-			E31-6116-05	CONNECTING WIRE (27P)		
-			E31-6117-05	CONNECTING WIRE (CAR)		
-			E31-6118-05	CONNECTING WIRE (HET)		
-			F05-3034-05	FUSE 30A ACY		
19	2D		F06-4027-05	FUSE 4A BLADE		
20	2D		F20-1005-04	INSULATING BOARD (FINAL)		
-			G02-0593-04	LEAF SPRING		
22	2C		G02-0594-04	LEAF SPRING		
23	1B, 3B		G10-0676-04	NON-WOVEN FABRIC (CABINET)		
-			G10-0691-04	NON-WOVEN FABRIC (PANEL)		
-			G10-0693-04	NON-WOVEN FABRIC (PANEL)		
26	2B		G13-0684-04	CUSHION (HEAT SINK)		
27	3B		G13-0942-04	CUSHION (LOWER CABINET)		
-		*	H13-0836-14	PROTECTION PLATE		
-		*	H01-8299-04	ITEM CARTON BOX (INSIDE)		
-			H03-2807-04	OUTER PACKING CASE		
-			H10-2680-02	POLYSTYRENE FOAMED FIXTURE (F)		
-			H10-2681-02	POLYSTYRENE FOAMED FIXTURE (R)		
-			H20-1410-03	PROTECTION COVER		
-			H25-0029-04	PROTECTION BAG (FUSE, PLUG)		
-			H25-0079-04	PROTECTION BAG (MIC)		
-			H25-0096-04	PROTECTION BAG (WING SCREW)		
-			H25-0112-04	PROTECTION BAG		
30	3B	*	J02-0323-05	FOOT		
-			J13-0413-05	FUSE HOLDER		
-			J19-1376-15	MIC HANGER (A)		
32	2A		J31-0141-04	SPACER RING (MIC)		
33	2C		J50-0401-05	HINGE		
-			J61-0307-05	WIRE BAND		
40	2A		K29-4519-04	KNOB (POWER SW)		
41	2A		K29-4538-03	KNOB (MAIN DIAL)		
42	2A		K29-4539-04	KNOB		

E: Scandinavia & Europe K: USA P: Canada W: Europe

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## PARTS LIST

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RADIOTELEPHONE

FINAL UNIT (X45-3370-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
43	2A		K29-4540-14	KNØB		
44	2B	*	K29-4543-04	KNØB (RUBBER KEY)		
B	1D, 2D		N09-2078-05	SCREW		
B	1C, 1D		N09-2079-05	SCREW		
-			N09-2080-05	WING SCREW (M4X10 ACSY)		
C	1B, 3B		N09-2083-05	FLAT SCREW		
D	2A, 2C		N09-2084-05	SEMUSE SCREW		
-		*	N09-2106-05	SCREW (FOR MIC HANGER ACSY)		
-		*	N15-1040-60	FLAT WASHER (ACSY)		
E	2A, 1B		N32-3006-46	FLAT SCREW		
F	2A		N35-3006-46	BINDING SCREW (PANEL ETC)		
G	2D		N52-2608-60	TAPPING SCREW (BLADE FUSE)		
H	2C, 2D		N87-3006-46	TAPTITE SCREW (SHIELD COVER)		
J	2C		N88-3006-46	TAPTITE SCREW (HINGE)		
50	2A	*	T07-0227-25	LOUDSPEAKER (FULLRANGE)		
-			T91-0388-05	MICROPHONE		
53	1C	*	X45-3370-21	FINAL UNIT		
54	2B, 3C	*	X53-3280-21	CONTROL UNIT		
55	2C, 2D	*	X57-3470-21	TX-RX UNIT		
FINAL UNIT (X45-3370-21)						
C1			CK73FB1H561K	CHIP C	560PF	K
C2			CK73FB1H103K	CHIP C	0.010UF	K
C3 , 4			CK73FB1H223K	CHIP C	0.022UF	K
C5 , 6			CK73FB1H102K	CHIP C	1000PF	K
C7			CK73FB1H223K	CHIP C	0.022UF	K
C8 , 9			CK73FB1H103K	CHIP C	0.010UF	K
C10			CC45SL2H471J	CERAMIC	470PF	J
C11 , 12			C91-1004-05	CHIP C	0.0068UF	J
C13 , 14			CM73F2H122J	CHIP C	1200PF	J
C15 -18			CC45SL2H221J	CERAMIC	220PF	J
C19			CE04EW1E101M	ELECTRO	100UF	25WV
C20			CK73EB1H473K	CHIP C	0.047UF	K
C21			CK73FB1H103K	CHIP C	0.010UF	K
C22			CK73EB1H473K	CHIP C	0.047UF	K
C23			CK73FB1H223K	CHIP C	0.022UF	K
C24			C91-0119-05	CERAMIC	0.047UF	K
C25			CE04EW1C100M	ELECTRO	10UF	16WV
C26			CK73FB1H223K	CHIP C	0.022UF	K
C27			CE04EW1E101M	ELECTRO	100UF	25WV
C28			CK73FB1H223K	CHIP C	0.022UF	K
C29			CK73FB1H102K	CHIP C	1000PF	K
C30			C91-0119-05	CERAMIC	0.047UF	K
C31			CE04EW1C100M	ELECTRO	10UF	16WV
C32 -37			CK73FB1H103K	CHIP C	0.010UF	K
C38			CK73EB1H473K	CHIP C	0.047UF	K
C40			C90-0817-05	ELECTRO	1000UF	16WV
C41			CK73EB1H473K	CHIP C	0.047UF	K
C42			CK73FB1H223K	CHIP C	0.022UF	K
C43			CE04EW1E470M	ELECTRO	47UF	25WV
C44			CK73EB1H473K	CHIP C	0.047UF	K
C45			CE04EW1E470M	ELECTRO	47UF	25WV
C46			CK73FB1H223K	CHIP C	0.022UF	K
C47 , 48			CE04EW1E470M	ELECTRO	47UF	25WV

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FINAL UNIT (X45-3370-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C49			CK73EB1H473K	CHIP C 0.047UF K		
C50 -57			CK73FB1H103K	CHIP C 0.010UF K		
C58			CK73EB1H473K	CHIP C 0.047UF K		
C59			CK45F1H103Z	CERAMIC 0.010UF Z		
C60 ,61			CK73EB1H104K	CHIP C 0.10UF K		
C62		*	C90-2125-05	ELECTRO 68UF 20WV		
C101			CC45SL2H331J	CERAMIC 330PF J		
C102			CC45SL2H271J	CERAMIC 270PF J		
C103			CC45SL2H471J	CERAMIC 470PF J		
C104,105			CM93D2H561J	MICA 560PF J		
C106,107			CC45SL2H271J	CERAMIC 270PF J		
C108,109			CM93D2H681J	MICA 680PF J		
C110			CC45SL2H221J	CERAMIC 220PF J		
C111			CM93D2H561J	MICA 560PF J		
C112			CC45SL2H271J	CERAMIC 270PF J		
C113,114			CC45SL2H331J	CERAMIC 330PF J		
C115			CC45SL2H150J	CERAMIC 15PF J		
C116			CC45SL2H270J	CERAMIC 27PF J		
C117			CM93D2H821J	MICA 820PF J		
C118			CC45SL2H221J	CERAMIC 220PF J		
C119			CC45SL2H271J	CERAMIC 270PF J		
C120			CC45SL2H471J	CERAMIC 470PF J		
C121			CC45SL2H151J	CERAMIC 150PF J		
C122,123			CC45SL2H331J	CERAMIC 330PF J		
C124			CC45SL2H470J	CERAMIC 47PF J		
C125			CC45SL2H391J	CERAMIC 390PF J		
C126			CC45SL2H181J	CERAMIC 180PF J		
C127			CC45SL2H121J	CERAMIC 120PF J		
C128			CC45SL2H181J	CERAMIC 180PF J		
C129			CC45SL2H331J	CERAMIC 330PF J		
C130			CC45SL2H271J	CERAMIC 270PF J		
C131			CC45SL2H330J	CERAMIC 33PF J		
C132			CC45SL2H390J	CERAMIC 39PF J		
C133			CC45SL2H471J	CERAMIC 470PF J		
C134			CC45SL2H680J	CERAMIC 68PF J		
C135			CC45SL2H101J	CERAMIC 100PF J		
C136			CC45SL2H331J	CERAMIC 330PF J		
C137			CC45SL2H181J	CERAMIC 180PF J		
C138			CC45SL2H270J	CERAMIC 27PF J		
C139			CC45SL2H331J	CERAMIC 330PF J		
C140			CC45SL2H470J	CERAMIC 47PF J		
C141			CC45SL2H271J	CERAMIC 270PF J		
C142			CC45SL2H121J	CERAMIC 120PF J		
C143			CC45SL2H220J	CERAMIC 22PF J		
C144			CC45SL2H270J	CERAMIC 27PF J		
C145,146			CC45SL2H121J	CERAMIC 120PF J		
C147			CC45SL2H180J	CERAMIC 18PF J		
C148			CC45SL2H820J	CERAMIC 82PF J		
C149			CC45SL2H220J	CERAMIC 22PF J		
C150			CC45SL2H680J	CERAMIC 68PF J		
C151			CC45SL2H180J	CERAMIC 18PF J		
C152			CC45SL2H151J	CERAMIC 150PF J		
C153			CC45SL2H560J	CERAMIC 56PF J		
C154			CC45SL2H470J	CERAMIC 47PF J		
C155			CC45SL2H150J	CERAMIC 15PF J		

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C156-159 C160 C161,162 C163 C164			CK73FB1H103K CE04EW1H010M CK73FB1H103K CC73FSL1H101J CC73FCH1H560J	CHIP C 0.010UF K ELECTRO 1.0UF 50WV CHIP C 0.010UF K CHIP C 100PF J CHIP C 56PF J		
C165 C166-200 C201 C202 C203			CC73FCH1H030C CK73FB1H103K CC73FSL1H101J CC73FSL1H181J CC73FCH1H390J	CHIP C 3.0PF C CHIP C 0.010UF K CHIP C 100PF J CHIP C 180PF J CHIP C 39PF J		
C204 TC101			CM93D2H102J C05-0350-05	MICA 1000PF J TRIMMING CAP 20PF		
A1 -4 A5 A101 CN1			E31-6102-05 E23-0467-05 E23-0616-04 E23-0467-05 E40-3238-05	CONNECTING WIRE (RA) TERMINAL TERMINAL TERMINAL PIN CONNECTOR (3P)		
CN2 CN3 CN4 CN5 CN6			E40-3237-05 E40-3243-05 E40-3239-05 E04-0157-05 E40-3237-05	PIN CONNECTOR (2P) PIN CONNECTOR (8P) PIN CONNECTOR (4P) RF COAXIAL CABLE JACK (P0) PIN CONNECTOR (2P)		
CN7 CN101 CN102 CN103 J1	1D		E40-0211-05 E04-0157-05 E40-3239-05 E40-3242-05 E04-0167-05	PIN CONNECTOR (2P) RF COAXIAL CABLE JACK (RA) PIN CONNECTOR (4P) PIN CONNECTOR (7P) ANT RECEPTACLE (ANT)		
W2 W3 W4 ,5 W6 W101			E31-6083-05 E31-6107-05 E31-6105-05 E31-6106-05 E31-6085-05	CONNECTING WIRE (DI) CONNECTING WIRE (FUSE) CONNECTING WIRE (+B) CONNECTING WIRE (DC CONNECTOR) CONNECTING WIRE (PI)		
A6 A8 A9 A10 M1	1C 1C 1C 1C		F01-0974-01 F20-1038-04 F20-0078-05 F29-0014-05 F09-0417-05	HEAT SINK INSULATING BOARD INSULATING BOARD (Q1) INSULATOR HEAD PROTECTOR		
A13 ,14	2C		G02-0574-04	LEAF SPRING (IC1)		
100 - A11 ,12	1C 1C		J32-0916-04 J61-0307-05 J42-0461-05	STUD (Q4) WIRE BAND POWER CORD BUSHING		
L1 L2 L3 L4 -6 L7			L40-1501-14 L40-3391-14 L39-0481-05 L33-0699-05 L19-0342-05	SMALL FIXED INDUCTOR 15UH SMALL FIXED INDUCTOR 3.3UH TOROIDAL COIL CHOKE COIL BALUN TRANSFORMER		
L8 ,9 L10 L11 L12 L13			L33-0699-05 L39-0482-05 L39-0431-05 L33-0651-05 L33-0625-15	CHOKE COIL TOROIDAL COIL TOROIDAL COIL CHOKE COIL CHOKE COIL		
L14 L15			L15-0016-05 L40-1011-14	LOW-FREQUENCY CHOKE COIL SMALL FIXED INDUCTOR 100UH		

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L16			L33-0699-05	CHOKE COIL		
L101			L39-0461-05	TOROIDAL COIL		
L102			L39-0459-05	TOROIDAL COIL		
L103			L39-0474-05	TOROIDAL COIL		
L104			L39-0475-05	TOROIDAL COIL		
L105			L39-0467-05	TOROIDAL COIL		
L106			L39-0468-05	TOROIDAL COIL		
L107, 108			L39-0469-05	TOROIDAL COIL		
L109			L39-0471-05	TOROIDAL COIL		
L110, 111			L39-0470-05	TOROIDAL COIL		
L112			L34-1283-05	COIL		
L113			L34-1284-05	COIL		
L114			L34-1283-05	COIL		
L115			L34-1285-05	COIL		
L116			L34-1286-05	COIL		
L117			L34-1285-05	COIL		
L118			L34-1287-05	COIL		
L119			L34-1288-05	COIL		
L120			L40-1021-14	SMALL FIXED INDUCTOR 1MH		
L121			L39-0480-05	TOROIDAL COIL		
L122			L40-1021-14	SMALL FIXED INDUCTOR 1MH		
L123			L39-0472-05	TOROIDAL COIL		
L124			L40-2201-14	SMALL FIXED INDUCTOR 22UH		
L125			L40-2201-13	SMALL FIXED INDUCTOR 22UH		
L126			L40-2201-14	SMALL FIXED INDUCTOR 22UH		
L127, 128			L34-1035-05	COIL		
K	1C		N09-2076-05	SCREW (M2.6, Q1)		
L	1C		N09-2077-05	SCREW		
A	1D		N09-2078-05	SCREW (M3, Q2-6)		
F	1C		N35-3006-46	BINDING SCREW (FAN)		
H	1C, 2D		N87-3006-46	TAPTITE SCREW		
R1			RK73FB2A821J	CHIP R 820 J 1/10W		
R2			RK73FB2A5R6J	CHIP R 5.6 J 1/10W		
R3			RK73FB2A821J	CHIP R 820 J 1/10W		
R4			RK73FB2A560J	CHIP R 56 J 1/10W		
R5			RK73FB2A331J	CHIP R 330 J 1/10W		
R6			RK73FB2A681J	CHIP R 680 J 1/10W		
R7			RK73FB2A331J	CHIP R 330 J 1/10W		
R8 ,9			R92-1243-05	CHIP R 8.2 1/4W		
R10 ,11			R92-1242-05	CHIP R 6.8 1/4W		
R12 ,13		*	R92-0696-05	CHIP R 33 1/4W		
R14 ,15		*	RS14DB3A101J	FL-PROOF RS 100 J 1W		
R16 -19		*	RS14DB3D4R7J	FL-PROOF RS 4.7 J 2W		
R20 ,21			RS14DB3A150J	FL-PROOF RS 15 J 1W		
R22 ,23			RS14DB3A3R3J	FL-PROOF RS 3.3 J 1W		
R24			RS14DB3A100J	FL-PROOF RS 10 J 1W		
R25			R92-1253-05	CHIP R 82 1/2W		
R26			RK73FB2A561J	CHIP R 560 J 1/10W		
R27			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R28			RK73FB2A103J	CHIP R 10K J 1/10W		
R29			R92-0670-05	CHIP R 0 OHM		
R101-104			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R105			RK73FB2A333J	CHIP R 33K J 1/10W		
R106			RK73FB2A103J	CHIP R 10K J 1/10W		

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FINAL UNIT (X45-3370-21)

CONTROL UNIT (X53-3280-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R107 R108 R109 R110 R111		*	RK73FB2A563J RK73FB2A100J R92-0696-05 R92-1244-05 R92-1245-05	CHIP R 56K J 1/10W CHIP R 10 J 1/10W CHIP R 33 1/4W CHIP R 27 1/4W CHIP R 47 1/4W		
R112 R113-126 R127-129 VR1 VR2			R92-1246-05 RK73FB2A122J RK73FB2A472J R12-0442-05 R12-1431-05	CHIP R 47K 1/4W CHIP R 1.2K J 1/10W CHIP R 4.7K J 1/10W TRIMMING POT.220 TRIMMING POT.1K		
VR101 W104			R12-0431-05 R92-1061-05	TRIMMING POT.100 JUMPER RES 0 OHM		
K1 K101-115 K116			S51-2423-05 S51-1440-05 S51-1441-05	RELAY (POWER) RELAY RELAY (RA)		
D1 D2 -4 D5 D6 D7 ,8		*	KB-365 KB-162 SG-5L(R) 02CZ20(Y,Z) DLS1585	VARISTOR VARISTOR DIODE ZENER DIODE(20V) CHIP DIODE		
D101-103 D104 D105-113 IC1 IC2		*	1SS101 DSA301LA-S DLS1585 UPC78M08H UPC78M05H	DIODE DIODE CHIP DIODE IC(VOLTAGE REGULATOR/ +8V) IC(VOLTAGE REGULATOR/ +5V)		
IC101 Q1 Q2 ,3 Q4 ,5 Q6		*	TC4028BF 2SC1971 2SC3133 2SC2879(Q,Y) 2SD1406(Y)	IC(BCD-TO-DECIMAL DECODER) TRANSISTOR TRANSISTOR TRANSISTOR TRANSISTOR		
Q7 Q8 Q101 Q102 Q103			DTC124EK DTD114EK 2SA1362(Y) DTD114EK 2SA1362(Y)	DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q104 Q105 Q106 Q107-113 Q114-120			DTD114EK DTA144EK 2SC2712(Y) 2SA1362(Y) DTD114EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
TH1 Z1	1C		5TP41L X59-3370-00	THERMISTOR 10K MODULE UNIT (FAN PROTECTION)		
<b>CONTROL UNIT (X53-3280-21)</b>						
A200 D10 C1 C2 C3 C4 -7 C8 ,9 C10 C11	2B		B38-0324-05 B30-0880-05 CK73FB1H102K CE04EW1C101M CE04EW1C470M CK73FB1H102K CC73FCH1H100D CK73FB1H223K CC73FCH1H220J	LCD ASSY LED CHIP C 1000PF K ELECTRO 100UF 16WV ELECTRO 47UF 16WV CHIP C 1000PF K CHIP C 10PF D CHIP C 0.022UF K CHIP C 22PF J		

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CONTROL UNIT (X53-3280-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C12			CK73FB1H223K	CHIP C 0.022UF K		
C13			CE04EW1C470M	ELECTRØ 47UF 16WV		
C14 ,15			CC73FCH1H470J	CHIP C 47PF J		
C16			CK73FB1H102K	CHIP C 1000PF K		
C17			CK73FB1H223K	CHIP C 0.022UF K		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CK73EB1H104K	CHIP C 0.10UF K		
C20			CK73FB1H223K	CHIP C 0.022UF K		
C21			CE04EW1C470M	ELECTRØ 47UF 16WV		
C22			CK73FB1H103K	CHIP C 0.010UF K		
C23 ,24			C92-0004-05	CHIP-TAN 1UF 10WV		
C25			C91-1102-05	FILM 0.10UF J		
C26			CK73FB1H103K	CHIP C 0.010UF K		
C27			CE04EW1A221M	ELECTRØ 220UF 10WV		
C28			CK73FB1H103K	CHIP C 0.010UF K		
C29			CE04EW1A221M	ELECTRØ 220UF 10WV		
C30			CK73FB1H223K	CHIP C 0.022UF K		
C31			CE04EW1C470M	ELECTRØ 47UF 16WV		
C32 ,33			CK73FB1H102K	CHIP C 1000PF K		
C34			CK73FB1H103K	CHIP C 0.010UF K		
C35			CC73FCH1H470J	CHIP C 47PF J		
C36			CC73FSL1H391J	CHIP C 390PF J		
C37			CC73FCH1H470J	CHIP C 47PF J		
C38			CC73FCH1H330J	CHIP C 33PF J		
C39			CC73FCH1H060D	CHIP C 6.0PF D		
C40			CC73FCH1H470J	CHIP C 47PF J		
C41			CC73FCH1H180J	CHIP C 18PF J		
C42			CC73FCH1H270J	CHIP C 27PF J		
C43			CK73FB1H102K	CHIP C 1000PF K		
C44			CK73FB1H103K	CHIP C 0.010UF K		
C45			CK73FB1H102K	CHIP C 1000PF K		
C46 -49			CK73FB1H103K	CHIP C 0.010UF K		
C50			CK73FB1H223K	CHIP C 0.022UF K		
C51 -53			CK73FB1H103K	CHIP C 0.010UF K		
C54			CC73FCH1H390J	CHIP C 39PF J		
C55			CC73FSL1H181J	CHIP C 180PF J		
C56			CC73FCH1H270J	CHIP C 27PF J		
C57			CC73FCH1H680J	CHIP C 68PF J		
C58			CC73FCH1H560J	CHIP C 56PF J		
C59			CC73FCH1H270J	CHIP C 27PF J		
C60			CC73FCH1H100D	CHIP C 10PF D		
C61			CC73FCH1H390J	CHIP C 39PF J		
C62 ,63			CC73FCH1H180J	CHIP C 18PF J		
C64 ,65			CK73FB1H103K	CHIP C 0.010UF K		
C66			CC73FCH1H470J	CHIP C 47PF J		
C67			CC73FSL1H271J	CHIP C 270PF J		
C68			CC73FCH1H330J	CHIP C 33PF J		
C69			CC73FCH1H820J	CHIP C 82PF J		
C70			CC73FCH1H680J	CHIP C 68PF J		
C71			CC73FCH1H220J	CHIP C 22PF J		
C72			CC73FCH1H180J	CHIP C 18PF J		
C73			CC73FCH1H270J	CHIP C 27PF J		
C74			CC73FCH1H330J	CHIP C 33PF J		
C75			CC73FCH1H220J	CHIP C 22PF J		
C76 ,77			CK73FB1H103K	CHIP C 0.010UF K		

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## PARTS LIST

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## CONTROL UNIT (X53-3280-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C78			CC73FCH1H470J	CHIP C 47PF J		
C79			CK73FB1H103K	CHIP C 0.010UF K		
C80			CK73FB1H102K	CHIP C 1000PF K		
C81			CC73FCH1H060D	CHIP C 6.0PF D		
C82			CK73FB1H103K	CHIP C 0.010UF K		
C83			CK73FB1H102K	CHIP C 1000PF K		
C84			CC73FSL1H101J	CHIP C 100PF J		
C85			CK73FB1H223K	CHIP C 0.022UF K		
C86			CK73FB1H102K	CHIP C 1000PF K		
C87			CK73EB1H104K	CHIP C 0.10UF K		
C88			CK73FB1H223K	CHIP C 0.022UF K		
C89			CE04EW1C470M	ELECTR 47UF 16WV		
C90			CK73FB1H103K	CHIP C 0.010UF K		
C91			CK73EB1H104K	CHIP C 0.10UF K		
C92			CK73EB1H103K	CHIP C 0.01UF K		
C93			CE04EW1C470M	ELECTR 47UF 16WV		
C94			CK73FB1H102K	CHIP C 1000PF K		
C95			CC73FCH1H330J	CHIP C 33PF J		
C96			CC73FCH1H120J	CHIP C 12PF J		
C97			CC73FCH1H220J	CHIP C 22PF J		
C98			CC73FCH1H470J	CHIP C 47PF J		
C99			CE04EW1C101M	ELECTR 100UF 16WV		
C100			CK73FB1H223K	CHIP C 0.022UF K		
C101, 102			CK73FB1H102K	CHIP C 1000PF K		
C103			CK73FB1H103K	CHIP C 0.010UF K		
C104			CK73FB1H223K	CHIP C 0.022UF K		
C105			CK73FB1H681K	CHIP C 680PF K		
C106			CK73FB1H102K	CHIP C 1000PF K		
C107			CK73FB1H681K	CHIP C 680PF K		
C108			CK73FB1H103K	CHIP C 0.010UF K		
C109			CK73FB1H102K	CHIP C 1000PF K		
C110			CC73FSL1H101J	CHIP C 100PF J		
C111, 112			CK73FB1H103K	CHIP C 0.010UF K		
C113			CK73FB1H223K	CHIP C 0.022UF K		
C114-116			CK73FB1H103K	CHIP C 0.010UF K		
C117			CE04EW1HR47M	ELECTR 0.47UF 50WV		
C118			CK73EB1H102K	CHIP C 1000PF K		
C119			CK73EB1H104K	CHIP C 0.10UF K		
C120			CK73FB1H223K	CHIP C 0.022UF K		
C121			CE04EW1C470M	ELECTR 47UF 16WV		
C122			CK73FB1H103K	CHIP C 0.010UF K		
C123			CK73EB1H104K	CHIP C 0.10UF K		
C124			CK73FB1H103K	CHIP C 0.010UF K		
C125			CE04EW1C470M	ELECTR 47UF 16WV		
C126			CK73FB1H102K	CHIP C 1000PF K		
C127			CC73FCH1H180J	CHIP C 18PF J		
C128			CC73FCH1H050C	CHIP C 5.0PF C		
C129			CC73FCH1H220J	CHIP C 22PF J		
C130			CC73FCH1H470J	CHIP C 47PF J		
C131			CE04EW1C101M	ELECTR 100UF 16WV		
C132			CK73FB1H223K	CHIP C 0.022UF K		
C133, 134			CK73FB1H102K	CHIP C 1000PF K		
C135			CK73FB1H103K	CHIP C 0.010UF K		
C136			CK73FB1H223K	CHIP C 0.022UF K		
C137			CK73FB1H471K	CHIP C 470PF K		

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C138			CK73FB1H821K	CHIP C 820PF K		
C139			CK73FB1H471K	CHIP C 470PF K		
C140			CK73FB1H103K	CHIP C 0.010UF K		
C141, 142			CK73FB1H102K	CHIP C 1000PF K		
C143			CC73FSL1H101J	CHIP C 100PF J		
C144-147			CK73FB1H103K	CHIP C 0.010UF K		
C148			CK73FB1H223K	CHIP C 0.022UF K		
C149			CC73FCH1H220J	CHIP C 22PF J		
C150			CK73FB1H223K	CHIP C 0.022UF K		
C151			CK73FB1H103K	CHIP C 0.010UF K		
C152, 153			CK73FB1H223K	CHIP C 0.022UF K		
C200-205			CK73FB1H471K	CHIP C 470PF K		
C206-212			CK73FB1H103K	CHIP C 0.010UF K		
C300-307			CK73FB1H103K	CHIP C 0.010UF K		
C308			CK73FB1H471K	CHIP C 470PF K		
C309			CK73FB1H103K	CHIP C 0.010UF K		
C310			CK73FB1H471K	CHIP C 470PF K		
C311-314			CK73FB1H103K	CHIP C 0.010UF K		
C315-318			CK73FB1H471K	CHIP C 470PF K		
C320			CK73FB1H223K	CHIP C 0.022UF K		
C322			CE04EW1C470M	ELECTR0 47UF 16WV		
C325, 326			CK73FB1H103K	CHIP C 0.010UF K		
C327-337			CK73FB1H102K	CHIP C 1000PF K		
C328			CK73FB1H223K	CHIP C 0.022UF K		
C339			CK73FB1H103K	CHIP C 0.010UF K		
C340			CK73FB1H223K	CHIP C 0.022UF K		
C341			CK73FB1H103K	CHIP C 0.010UF K		
C342			CK73FB1H102K	CHIP C 1000PF K		
C343			CK73FB1H103K	CHIP C 0.010UF K		
C344			CK73FB1H102K	CHIP C 1000PF K		
C345			CK73FB1H103K	CHIP C 0.010UF K		
C346			CK73FB1H102K	CHIP C 1000PF K		
C347			CK73FB1H103K	CHIP C 0.010UF K		
C348			CK73FB1H223K	CHIP C 0.022UF K		
C349			CE04EW1C470M	ELECTR0 47UF 16WV		
C350			CK73FB1H103K	CHIP C 0.010UF K		
C351			CE04EW1C470M	ELECTR0 47UF 16WV		
C352, 353			CK73FB1H102K	CHIP C 1000PF K		
C354-356			CK73FB1H103K	CHIP C 0.010UF K		
C357-361			CK73FB1H102K	CHIP C 1000PF K		
C362, 363			CC73FCH1H100D	CHIP C 10PF D		
C364			C90-2041-05	ELECTR0 10UF 10WV		
C365			CK73FB1H103K	CHIP C 0.010UF K		
C366			CE04EW1C470M	ELECTR0 47UF 16WV		
C367-373			CK73FB1H103K	CHIP C 0.010UF K		
C374			CK73FB1H102K	CHIP C 1000PF K		
C375			CK73FB1H103K	CHIP C 0.010UF K		
C376			CE04EW1C470M	ELECTR0 47UF 16WV		
C377, 378			CK73FB1H103K	CHIP C 0.010UF K		
C379			C92-0008-05	CHIP TAN 3.3UF 16WV		
C380			CE04EW1C101M	ELECTR0 100UF 16WV		
C381, 382			CK73FB1H103K	CHIP C 0.010UF K		
C383			CE04EW1C470M	ELECTR0 47UF 16WV		
C384			CK73FB1H103K	CHIP C 0.010UF K		
C386			CK73FB1H223K	CHIP C 0.022UF K		

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C387 C388, 389 C390 C391 C392-413			CE04EW1C470M CK73FB1H103K CE04EW1C470M CK73FB1H103K CK73FB1H102K	ELECTRO 47UF 16WV CHIP C 0.010UF K ELECTRO 47UF 16WV CHIP C 0.010UF K CHIP C 1000PF K		
C414 C415, 416 C417 C418			CE04EW1C470M CK73FB1H103K CE04EW1C470M CK73FB1H103K	ELECTRO 47UF 16WV CHIP C 0.010UF K ELECTRO 47UF 16WV CHIP C 0.010UF K		
A201 CN1 -3 CN200 CN202 CN206			E23-0623-04 E04-0157-05 E40-5340-05 E40-5341-05 E40-3299-05	TERMINAL (MIC) RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (27P) PIN CONNECTOR PIN CONNECTOR (2P)		
CN300 CN301 CN302 J200 J201			E40-3853-05 E40-3855-05 E02-2015-05 E06-0858-15 E11-0440-05	PIN CONNECTOR (25P) PIN CONNECTOR (27P) IC SOCKET (IC310) 8P METAL SOCKET (MIC) PHONE JACK		
TP1 ,2 TP4 W200 W201 W202		*	E23-0465-05 E23-0465-05 E31-6111-05 E31-6112-05 E31-6114-05	TERMINAL TERMINAL CONNECTING WIRE CONNECTING WIRE CONNECTING WIRE		
A1 ,2			F11-0881-14	SHIELDING COVER		
CF1 L1 L2 L3 L4			L72-0369-05 L40-1011-48 L40-6892-48 L40-1011-48 L40-6882-48	CERAMIC FILTER 10.695MHZ SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 6.8UH SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 0.68UH		
L5 L6 L7 L8 L9			L40-1082-48 L40-8272-48 L40-5672-48 L40-3982-48 L40-4782-48	SMALL FIXED INDUCTOR 0.1UH SMALL FIXED INDUCTOR 82NH SMALL FIXED INDUCTOR 56NH SMALL FIXED INDUCTOR 0.39UH SMALL FIXED INDUCTOR 0.47UH		
L10 L11 -13 L14 L15 L19			L40-3382-48 L40-2782-48 L40-2282-48 L40-1582-48 L40-2782-48	SMALL FIXED INDUCTOR 0.33UH SMALL FIXED INDUCTOR 0.27UH SMALL FIXED INDUCTOR 0.22UH SMALL FIXED INDUCTOR 0.15UH SMALL FIXED INDUCTOR 0.27UH		
L20 L21 L22 L23 ,24 L25 ,26			L40-1011-48 L34-4220-05 L40-1001-48 L40-2211-48 L34-4219-05	SMALL FIXED INDUCTOR 100UH COIL SMALL FIXED INDUCTOR 10UH SMALL FIXED INDUCTOR 220UH COIL		
L27 L28 L29 L30 ,31 L32			L40-1011-48 L34-4221-05 L40-1001-48 L40-1511-48 L30-0281-15	SMALL FIXED INDUCTOR 100UH COIL SMALL FIXED INDUCTOR 10UH SMALL FIXED INDUCTOR 150UH IFT		
L33 L300 L302 L303, 304			L40-2211-48 L40-2211-14 L40-1011-14 L40-1011-13	SMALL FIXED INDUCTOR 220UH SMALL FIXED INDUCTOR 220UH SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 100UH		

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L305,306 L307-311 X300 XF1			L40-1011-48 L40-1011-14 L77-1380-05 L71-0404-05	SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 100UH CRYSTAL RESONATOR 11.0592MHZ CRYSTAL FILTER 30.685MHZ		
CP300 CP301 R1 R2 R3			R90-0598-05 R90-0455-05 RK73FB2A102J RK73FB2A473J RK73FB2A223J	MULTI-COMP MULTI-COMP 4.7KX8 J 1/4W CHIP R 1.0K J 1/10W CHIP R 47K J 1/10W CHIP R 22K J 1/10W		
R4 R5 R6 R7 R8			RK73FB2A561J RK73FB2A101J RK73FB2A154J RK73FB2A121J RK73FB2A122J	CHIP R 560 J 1/10W CHIP R 100 J 1/10W CHIP R 150K J 1/10W CHIP R 120 J 1/10W CHIP R 1.2K J 1/10W		
R9 R10 R11 ,12 R13 -16 R17			RK73FB2A393J RK73FB2A102J RK73FB2A101J RK73FB2A681J RK73FB2A101J	CHIP R 39K J 1/10W CHIP R 1.0K J 1/10W CHIP R 100 J 1/10W CHIP R 680 J 1/10W CHIP R 100 J 1/10W		
R18 R19 R20 R21 R22			RK73FB2A332J RK73FB2A103J RK73FB2A224J RK73FB2A332J RK73FB2A152J	CHIP R 3.3K J 1/10W CHIP R 10K J 1/10W CHIP R 220K J 1/10W CHIP R 3.3K J 1/10W CHIP R 1.5K J 1/10W		
R23 R24 R25 ,26 R27 R28			RK73FB2A221J RK73FB2A470J RK73FB2A104J RK73FB2A181J RK73FB2A330J	CHIP R 220 J 1/10W CHIP R 47 J 1/10W CHIP R 100K J 1/10W CHIP R 180 J 1/10W CHIP R 33 J 1/10W		
R29 R30 R31 R32 R33			RK73FB2A562J RK73FB2A103J RK73FB2A100J RK73FB2A101J RK73FB2A471J	CHIP R 5.6K J 1/10W CHIP R 10K J 1/10W CHIP R 10 J 1/10W CHIP R 100 J 1/10W CHIP R 470 J 1/10W		
R34 R35 R36 R37 R38			RK73FB2A100J RK73FB2A471J RK73FB2A330J RK73FB2A103J RK73FB2A223J	CHIP R 10 J 1/10W CHIP R 470 J 1/10W CHIP R 33 J 1/10W CHIP R 10K J 1/10W CHIP R 22K J 1/10W		
R39 R40 ,41 R42 R43 R44 -47			RK73FB2A471J RK73FB2A101J RK73FB2A471J RK73FB2A151J RK73FB2A152J	CHIP R 470 J 1/10W CHIP R 100 J 1/10W CHIP R 470 J 1/10W CHIP R 150 J 1/10W CHIP R 1.5K J 1/10W		
R48 R49 R50 R51 R52			RK73FB2A151J RK73FB2A471J RK73FB2A332J RK73FB2A123J RK73FB2A331J	CHIP R 150 J 1/10W CHIP R 470 J 1/10W CHIP R 3.3K J 1/10W CHIP R 12K J 1/10W CHIP R 330 J 1/10W		
R53 R54 R55 R56 R57			RK73FB2A102J RK73FB2A101J RK73FB2A272J RK73FB2A822J RK73FB2A331J	CHIP R 1.0K J 1/10W CHIP R 100 J 1/10W CHIP R 2.7K J 1/10W CHIP R 8.2K J 1/10W CHIP R 330 J 1/10W		

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R58			RK73FB2A821J	CHIP R 820 J 1/10W		
R59 ,60			RK73FB2A101J	CHIP R 100 J 1/10W		
R61			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R62			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R63			RK73FB2A683J	CHIP R 68K J 1/10W		
R64			RK73FB2A221J	CHIP R 220 J 1/10W		
R65			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R66 ,67			RK73FB2A103J	CHIP R 10K J 1/10W		
R68			RK73FB2A223J	CHIP R 22K J 1/10W		
R69			RK73FB2A103J	CHIP R 10K J 1/10W		
R70			RK73FB2A223J	CHIP R 22K J 1/10W		
R71			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R72			RK73FB2A101J	CHIP R 100 J 1/10W		
R73			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R74			RK73FB2A101J	CHIP R 100 J 1/10W		
R75			RK73FB2A221J	CHIP R 220 J 1/10W		
R76			RK73FB2A471J	CHIP R 470 J 1/10W		
R77			RK73FB2A683J	CHIP R 68K J 1/10W		
R78			RK73FB2A471J	CHIP R 470 J 1/10W		
R79 ,80			RK73FB2A103J	CHIP R 10K J 1/10W		
R81			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R82			RK73FB2A473J	CHIP R 47K J 1/10W		
R83			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R84			RK73FB2A221J	CHIP R 220 J 1/10W		
R85 ,86			RK73FB2A103J	CHIP R 10K J 1/10W		
R87			RK73FB2A223J	CHIP R 22K J 1/10W		
R88			RK73FB2A101J	CHIP R 100 J 1/10W		
R89			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R90			RK73FB2A101J	CHIP R 100 J 1/10W		
R91			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R92			RK73FB2A101J	CHIP R 100 J 1/10W		
R93			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R94			RK73FB2A334J	CHIP R 330K J 1/10W		
R95			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R96			RK73FB2A471J	CHIP R 470 J 1/10W		
R97			RK73FB2A221J	CHIP R 220 J 1/10W		
R98			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R200,201			RK73FB2A471J	CHIP R 470 J 1/10W		
R202,203			R92-1213-05	CARBON R 100 J 1/2W		
R301			RK73FB2A471J	CHIP R 470 J 1/10W		
R302,303			RK73FB2A101J	CHIP R 100 J 1/10W		
R304,305			RK73FB2A471J	CHIP R 470 J 1/10W		
R306,307			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R308-317			RK73FB2A471J	CHIP R 470 J 1/10W		
R318,319			R92-1213-05	CARBON R 100 J 1/2W		
R320			RK73FB2A471J	CHIP R 470 J 1/10W		
R321			RK73FB2A103J	CHIP R 10K J 1/10W		
R322			RK73FB2A471J	CHIP R 470 J 1/10W		
R323,324			RK73FB2A473J	CHIP R 47K J 1/10W		
R325-340			RK73FB2A471J	CHIP R 470 J 1/10W		
R341			RK73FB2A101J	CHIP R 100 J 1/10W		
R342			RK73FB2A471J	CHIP R 470 J 1/10W		
R343			RK73FB2A101J	CHIP R 100 J 1/10W		
R344			RK73FB2A471J	CHIP R 470 J 1/10W		
R345			RK73FB2A101J	CHIP R 100 J 1/10W		

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R346-354 R355 R356 R357, 358 R359			RK73FB2A103J RK73EB2B560J RK73FB2A271J RK73FB2A472J RK73FB2A223J	CHIP R 10K J 1/10W CHIP R 56 J 1/8W CHIP R 270 J 1/10W CHIP R 4.7K J 1/10W CHIP R 22K J 1/10W		
R360 R361 R362 R363 R364-370			RK73FB2A103J RK73FB2A471J RK73FB2A223J RK73FB2A472J RK73FB2A471J	CHIP R 10K J 1/10W CHIP R 470 J 1/10W CHIP R 22K J 1/10W CHIP R 4.7K J 1/10W CHIP R 470 J 1/10W		
R371-374 R375 R376 R377, 378 R379			RK73FB2A103J RK73FB2A273J RK73FB2A220J RK73FB2A101J RK73FB2A104J	CHIP R 10K J 1/10W CHIP R 27K J 1/10W CHIP R 22 J 1/10W CHIP R 100 J 1/10W CHIP R 100K J 1/10W		
R380-383 R384 R385 R386 R389			RK73FB2A101J RK73FB2A103J RK73FB2A473J RK73FB2A472J RK73FB2A473J	CHIP R 100 J 1/10W CHIP R 10K J 1/10W CHIP R 47K J 1/10W CHIP R 4.7K J 1/10W CHIP R 47K J 1/10W		
R390, 391 R392 R393 VR200 VR201			RK73FB2A103J RK73FB2A472J RK73FB2A223J R01-3437-05 R01-3436-05	CHIP R 10K J 1/10W CHIP R 4.7K J 1/10W CHIP R 22K J 1/10W POTENTIOMETER 10K-B POTENTIOMETER 10K-U		
VR301, 302 VR303			R12-6469-05 R12-6471-05	POTENTIOMETER 4.7K POTENTIOMETER 10K		
S201-215 S216-220 S225 S226 S301			S50-1426-05 S40-2441-15 S40-2453-05 S40-2440-15 S59-4401-05	SENSITIVE SWITCH PUSH SWITCH PUSH SWITCH (POWER) PUSH SWITCH (SP OFF) DIP SWITCH		
D1 D2 -5 D6 D7 D8			1SS184 RLS135 1SS184 1SV166 1SS184	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE		
D9 D301 D302, 303 D304-306 D307			1SV166 02CZ11Y 1SS184 1SS272 02CZ4.7Y	CHIP DIODE ZENEBER DIODE CHIP DIODE CHIP DIODE ZENER DIODE(4.7V)		
D308 D309 D310 D311-313 D315			02CZ5.6Y 02CZ5.1X,Y 1SS181 1SS133 1SS184	ZENER DIODE(5.6V) ZENER DIODE(5.1V) CHIP DIODE DIODE CHIP DIODE		
D316, 317 IC1 IC2 IC3 IC4		*	1SS181 UPC78N05H HD74LS290FP CXD1225M TC4028BF	CHIP DIODE IC(5V AVR) IC(DIVIDER) IC(PLL IC) IC(BCD-TO-DECIMAL DECODER)		
IC5 IC6			SN76514N CXD1225M	IC(MIXER) IC(PLL IC)		

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CONTROL UNIT (X53-3280-21)

TX-RX UNIT (X57-3470-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
IC7 IC8 IC9 IC10 IC11			M54459L SN16913P CXD1225M M54459L SN16913P	IC(PRE SCALER) IC(DUBLE BALANCED MIXERS) IC(PLL IC) IC(PRE SCALER) IC(DUBLE BALANCED MIXERS)		
IC300 IC301 IC302 IC303 IC304		*	CXD1095Q UPC78N05H UPD78C10AGQ-36 TC74HC573AF TC74HC138AF	IC(I/O) IC(5V AVR) IC(CPU) IC(LATCH) IC(DECODER)		
IC305 IC306 IC307 IC308 IC310		*	M51951BML TC4S584F TC4SU69F TC4S71F 27C128-20JBG1	IC(SYSTEM RESET) IC(INVERTER) IC(INVERTER GATE) IC IC(EPR0M)		
IC311 IC312 Q1 -3 Q4 Q5 -7			MSM28C16A-20RS TC4S584F 2SC2714(Y) FMU1 2SC3324(G)	IC(EPR0M) IC CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q8 -11 Q12 Q13 Q14 Q15 -17			2SC2714(Y) DTC114EK 2SC2712(Y) FMC2 2SC3324(G)	CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q18 Q19 Q20 Q21 Q22 -24			2SC2714(Y) DTC114EK 2SC2712(Y) DTA114EK 2SC3324(G)	CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q25 Q26 Q27 Q28 Q29			FMU1 2SC2712(Y) 2SC2714(Y) DTC114EK DTA114EK	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q300 Q301 Q302 Q303 Q304			DTC143EK DTA143EK DTC143EK DTA143EK DTC114EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q305 Q306-308 Q309 Q310 Q311			DTD123EK DTC114EK 2SD1624S 2SC2712(Y) DTA143EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q312			2SC2712(Y)	CHIP TRANSISTOR		
BA300 BA200			W09-0625-05 W09-0877-05	LITHIUM BATTERY ENCODER BATTERY		
Z1 Z1 Z2 ,3			X58-3720-10 X58-3720-10 X59-3440-00	SUB UNIT SUB UNIT (VC0) MODULE UNIT (VC0)		
TX-RX UNIT (X57-3470-21)						
C1			CK73EB1H104K	CHIP C 0.10UF K		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C2			CC73FSL1H101J	CHIP C 100PF J		
C3			CC73FSL1H181J	CHIP C 180PF J		
C4			CC73FCH1H820J	CHIP C 82PF J		
C5			CK73FB1H223K	CHIP C 0.022UF K		
C6			CK73FB1H103K	CHIP C 0.010UF K		
C7			CK73FB1H682K	CHIP C 6800PF K		
C8 , 9			CK73EB1H104K	CHIP C 0.10UF K		
C10			CC73FSL1H121J	CHIP C 120PF J		
C11 , 12			CC73FCH1H820J	CHIP C 82PF J		
C13			CC73FSL1H221J	CHIP C 220PF J		
C14			CK73FB1H681K	CHIP C 680PF K		
C15			CC73FSL1H151J	CHIP C 150PF J		
C16 , 17			CK73EB1H104K	CHIP C 0.10UF K		
C18			CC73FSL1H331J	CHIP C 330PF J		
C19			CC73FCH1H390J	CHIP C 39PF J		
C20			CC73FSL1H331J	CHIP C 330PF J		
C21			CC73FSL1H391J	CHIP C 390PF J		
C22			CC73FSL1H181J	CHIP C 180PF J		
C23			CK73FB1H222K	CHIP C 2200PF K		
C24 , 25			CK73EB1H104K	CHIP C 0.10UF K		
C26			CC73FSL1H331J	CHIP C 330PF J		
C27			CC73FCH1H820J	CHIP C 82PF J		
C28			CC73FSL1H181J	CHIP C 180PF J		
C29			CC73FSL1H331J	CHIP C 330PF J		
C30			CK73FB1H102K	CHIP C 1000PF K		
C31			CC73FSL1H271J	CHIP C 270PF J		
C32 , 33			CK73EB1H104K	CHIP C 0.10UF K		
C34			CK73FB1H471K	CHIP C 470PF K		
C35			CC73FCH1H560J	CHIP C 56PF J		
C36			CC73FSL1H331J	CHIP C 330PF J		
C37			CK73FB1H471K	CHIP C 470PF K		
C38			CK73FB1H152K	CHIP C 1500PF K		
C39			CC73FSL1H391J	CHIP C 390PF J		
C40			CK73EB1H104K	CHIP C 0.10UF K		
C46			CK73EB1H104K	CHIP C 0.10UF K		
C47			CK73FB1H561K	CHIP C 560PF K		
C48			CC73FSL1H101J	CHIP C 100PF J		
C49			CK73FB1H471K	CHIP C 470PF K		
C50			CK73FB1H681K	CHIP C 680PF K		
C51			CK73FB1H392K	CHIP C 3900PF K		
C52			CK73FB1H471K	CHIP C 470PF K		
C53			CK73EB1H104K	CHIP C 0.10UF K		
C54			CK73FB1H821K	CHIP C 820PF K		
C55			CC73FSL1H221J	CHIP C 220PF J		
C56			CK73FB1H561K	CHIP C 560PF K		
C57			CK73FB1H152K	CHIP C 1500PF K		
C58			CK73FB1H472K	CHIP C 4700PF K		
C59			CK73FB1H102K	CHIP C 1000PF K		
C60 -62			CK73EB1H104K	CHIP C 0.10UF K		
C63			CK73FB1H152K	CHIP C 1500PF K		
C64			CC73FSL1H391J	CHIP C 390PF J		
C65			CK73FB1H102K	CHIP C 1000PF K		
C66 -68			CK73EB1H104K	CHIP C 0.10UF K		
C69			CK73FB1H222K	CHIP C 2200PF K		
C70			CK73FB1H681K	CHIP C 680PF K		

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C71 C72 ,73 C74 C75 C76			CK73FB1H152K CK73EB1H104K CC73FSL1H101J CC73FSL1H151J CC73FCH1H680J	CHIP C 1500PF K CHIP C 0.10UF K CHIP C 100PF J CHIP C 150PF J CHIP C 68PF J		
C77 C78 -80 C86 C87 C88			CK73FB1H102K CK73EB1H104K CK73FB1H103K CK73EB1H104K CK73FB1H102K	CHIP C 1000PF K CHIP C 0.10UF K CHIP C 0.010UF K CHIP C 0.10UF K CHIP C 1000PF K		
C89 C90 ,91 C92 -94 C95 C96			CK73FB1H103K CK73FB1H102K CC73FCH1H010C CK73FB1H102K CK73FB1H103K	CHIP C 0.010UF K CHIP C 1000PF K CHIP C 1.0PF C CHIP C 1000PF K CHIP C 0.010UF K		
C97 C98 C99 C100,101 C102			CK73FB1H102K CC73FCH1H010C CK73EB1H104K CK73FB1H102K CK73FB1H103K	CHIP C 1000PF K CHIP C 1.0PF C CHIP C 0.10UF K CHIP C 1000PF K CHIP C 0.010UF K		
C103,104 C105-107 C108 C109 C110			CK73FB1H102K CK73FB1H103K CK73FB1H223K CK73FB1H103K CK73FB1H102K	CHIP C 1000PF K CHIP C 0.010UF K CHIP C 0.022UF K CHIP C 0.010UF K CHIP C 1000PF K		
C111-120 C121,122 C126-131 C132 C133,134			CK73FB1H103K CC73FCH1H020C CK73FB1H103K CK73EB1H104K CE04EW1C100M	CHIP C 0.010UF K CHIP C 2.0PF C CHIP C 0.010UF K CHIP C 0.10UF K ELECTRØ 10UF 16WV		
C135 C136 C137 C138,139 C140			CK73EB1H104K CK73EB1H473K CK73FB1H223K CK73FB1H103K CE04EW1C100M	CHIP C 0.10UF K CHIP C 0.047UF K CHIP C 0.022UF K CHIP C 0.010UF K ELECTRØ 10UF 16WV		
C141 C142 C143,144 C145 C146			C90-2041-05 C92-0003-05 CK73FB1H103K CE04EW1C100M CE04EW1C220M	ELECTRØ 10UF 10WV CHIP TAN 0.47UF 25WV CHIP C 0.010UF K ELECTRØ 10UF 16WV ELECTRØ 22UF 16WV		
C147 C148 C150 C151,152 C153			CE04EW1C470M CK73EB1H104K CE04EW1C220M CE04EW1C470M CE04EW1C100M	ELECTRØ 47UF 16WV CHIP C 0.10UF K ELECTRØ 22UF 16WV ELECTRØ 47UF 16WV ELECTRØ 10UF 16WV		
C154 C155,156 C157 C158 C159			CK73FB1H102K CE04EW1C470M CE04EW1C471M CE04EW1C220M CE04EW1C470M	CHIP C 1000PF K ELECTRØ 47UF 16WV ELECTRØ 470UF 16WV ELECTRØ 22UF 16WV ELECTRØ 47UF 16WV		
C160 C161 C162 C166 C167 C163			C90-2076-05 C90-2045-05 CK73FB1H223K CQ92M1H104K CK73FB1H103K CK73FB1H332K	ELECTRØ 560UF 10WV ELECTRØ 2.2UF 25WV CHIP C 0.022UF K MYLAR 0.10UF K CHIP C 0.010UF K CHIP C 3300PF K		

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C169, 170 C171			CK73FB1H103K CK73FB1H222K	CHIP C 0.010UF K CHIP C 2200PF K		
C172, 173 C174			CK73FB1H103K CK73EB1H104K	CHIP C 0.010UF K CHIP C 0.10UF K		
C175 C176, 177 C178-180 C181-187 C188			CE04EW1C470M CK73FB1H103K CK73FB1H102K CK73FB1H103K CC73FSL1H101J	ELECTR0 47UF 16WV CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.010UF K CHIP C 100PF J		
C189 C190 C192 C193 C194			CE04EW1C470M CE04EW1H2R2M CE04EW1H2R2M CK73FB1H103K CE04EW1C100M	ELECTR0 47UF 16WV ELECTR0 2.2UF 50WV ELECTR0 2.2UF 50WV CHIP C 0.010UF K ELECTR0 10UF 16WV		
C195 C196 C197 C198 C199			CK73EB1H104K CE04EW1C470M CE04EW1H2R2M CE04EW1C100M CE04EW1C470M	CHIP C 0.10UF K ELECTR0 47UF 16WV ELECTR0 2.2UF 50WV ELECTR0 10UF 16WV ELECTR0 47UF 16WV		
C200 C206-208 C209 C210, 211 C212			CK73FB1H223K CK73FB1H103K CC73FCH1H470J CK73FB1H103K CC73FCH1H470J	CHIP C 0.022UF K CHIP C 0.010UF K CHIP C 47PF J CHIP C 0.010UF K CHIP C 47PF J		
C213 C214 C215, 216 C217 C218-220			CC73FCH1H220J CK73FB1H223K CK73FB1H103K CK73FB1H102K CK73FB1H103K	CHIP C 22PF J CHIP C 0.022UF K CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.010UF K		
C221, 222 C223 C224 C225 C226, 227			C92-0004-05 CK73FB1H103K CK73FB1H223K CC73FCH1H470J CK73FB1H103K	CHIP-TAN 1UF 16WV CHIP C 0.010UF K CHIP C 0.022UF K CHIP C 47PF J CHIP C 0.010UF K		
C228 C229, 230 C231 C232 C233-236			CK73FB1H102K CC73FCH1H470J CK73FB1H103K CK73FB1H102K CK73FB1H103K	CHIP C 1000PF K CHIP C 47PF J CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.010UF K		
C237 C238-240 C241 C244-246 C247, 248			CK73FB1H102K CK73FB1H103K CK73FB1H102K CK73FB1H102K CK73FB1H103K	CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1000PF K CHIP C 1000PF K CHIP C 0.010UF K		
C249 C250 C251, 252 C253 C255			CC73FSL1H101J CC73FCH1H080D CK73FB1H103K CC73FCH1H150J CC73FCH1H030C	CHIP C 100PF J CHIP C 8.0PF D CHIP C 0.010UF K CHIP C 15PF J CHIP C 3.0PF C		
C256 C257 C258 C259 C260			CK73EB1H104K CK73FB1H332K CK73FB1H222K CC73FSL1H151J CC73FCH1H120J	CHIP C 0.10UF K CHIP C 3300PF K CHIP C 2200PF K CHIP C 150PF J CHIP C 12PF J		

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C261			CC73FSL1H221J	CHIP C 220PF J		
C262			CC73FCH1H470J	CHIP C 47PF J		
C263-265			CK73EB1H104K	CHIP C 0.10UF K		
C266			CK73EB1H473K	CHIP C 0.047UF K		
C267			CK73EB1H104K	CHIP C 0.10UF K		
C268			CC73FCH1H560J	CHIP C 56PF J		
C269			CC73FCH1H820J	CHIP C 82PF J		
C270			CC73FSL1H391J	CHIP C 390PF J		
C271			CK73FB1H102K	CHIP C 1000PF K		
C272			CC73FSL1H101J	CHIP C 100PF J		
C273			CK73FB1H102K	CHIP C 1000PF K		
C274			CC73FCH1H050C	CHIP C 5.0PF C		
C275			CC73FCH1H040C	CHIP C 4.0PF C		
C276			CC73FCH1H270J	CHIP C 27PF J		
C277			CC73FCH1H100D	CHIP C 10PF D		
C278			CC73FCH1H150J	CHIP C 15PF J		
C280			CC73FCH1H060D	CHIP C 6.0PF D		
C286			CC73FCH1H060D	CHIP C 6.0PF D		
C287			CC73FCH1H220J	CHIP C 22PF J		
C288, 289			CK73FB1H103K	CHIP C 0.010UF K		
C290			CC73FCH1H080D	CHIP C 8.0PF D		
C291			CK73FB1H103K	CHIP C 0.010UF K		
C292			CC73FCH1H0R5C	CHIP C 0.5PF C		
C293			CC73FCH1H080D	CHIP C 8.0PF D		
C294-297			CK73FB1H103K	CHIP C 0.010UF K		
C298			CE04EW1H2R2M	ELECTR0 2.2UF 50WV		
C299-301			CK73FB1H103K	CHIP C 0.010UF K		
C302			CC73FSL1H471J	CHIP C 470PF J		
C303			CK73FB1H103K	CHIP C 0.010UF K		
C304			C90-2041-05	TANTAL 10UF 10WV		
C305			CE04EW1C100M	ELECTR0 10UF 16WV		
C306			CE04EW1C470M	ELECTR0 47UF 16WV		
C307			CE04EW1C221M	ELECTR0 220UF 16WV		
C308			CK73FB1H223K	CHIP C 0.022UF K		
C309-311			CE04EW1C470M	ELECTR0 47UF 16WV		
C312			CK73FB1H223K	CHIP C 0.022UF K		
C313			CE04EW1C101M	ELECTR0 100UF 16WV		
C314, 315			CK73FB1H102K	CHIP C 1000PF K		
C316			CE04EW1C101M	ELECTR0 100UF 16WV		
C317-320			CK73FB1H103K	CHIP C 0.010UF K		
C343-346			CK73FB1H103K	CHIP C 0.010UF K		
C327			CK73FB1H103K	CHIP C 0.010UF K		
C329-332			CK73FB1H103K	CHIP C 0.010UF K		
C333			CK73FB1H223K	CHIP C 0.022UF K		
C334-341			CK73FB1H103K	CHIP C 0.010UF K		
C347-350			CK73FB1H471K	CHIP C 470PF K		
C342			CK73FB1H102K	CHIP C 1000PF K		
C351, 352			CK73FB1H103K	CHIP C 0.010UF K		
C353-355			CK73FB1H223K	CHIP C 0.022UF K		
C356			CE04EW1E4R7M	ELECTR0 4.7UF 25WV		
C357-360			CK73FB1H103K	CHIP C 0.010UF K		
C366, 367			CK73FB1H103K	CHIP C 0.010UF K		
C368			CK73FB1H223K	CHIP C 0.022UF K		
C369-376			CK73FB1H103K	CHIP C 0.010UF K		
C390			CC73FCH1H050C	CHIP C 5.0PF C		
C391			CC73FCH1H820J	CHIP C 82PF J		
C392			CK73FB1H103K	CHIP C 0.010UF K		

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C393			CC73FSL1H101J	CHIP C 100PF J		
C394			CC73FCH1H100D	CHIP C 10PF D		
C395, 396			CK73FB1H103K	CHIP C 0.010UF K		
C397			CK73FB1H102K	CHIP C 1000PF K		
TC1			C05-0356-05	TRIMMING CAP 20PF		
CN1 -5			E04-0157-05	RF COAXIAL CABLE JACK		
CN6			E40-3242-05	PIN CONNECTOR (7P)		
CN7			E40-3243-05	PIN CONNECTOR (8P)		
CN8			E40-3240-05	PIN CONNECTOR (5P)		
CN10			E40-5339-05	PIN CONNECTOR (25P)		
CN11, 12			E40-3238-05	PIN CONNECTOR (3P)		
CN17			E40-3303-05	PIN CONNECTOR (6P)		
J1 ,2			E13-0166-05	PHONE JACK (RELAY, ALC)		
J3			E11-0433-05	PHONE JACK (KEY)		
J4			E11-0414-05	PHONE JACK (EXT.SP)		
TP1 ,2			E04-0154-05	RF COAXIAL CONNECTOR		
TP3 -5			E23-0465-05	TERMINAL		
W1			E31-6101-05	CONNECTING WIRE (AT CONNECT)		
A1	2D		F01-0975-04	HEAT SINK		
A2			F11-1072-14	SHIELDING COVER (FRONT)		
A3			F11-1014-04	SHIELDING COVER (HET)		
A4			F11-1071-14	SHIELDING COVER (BPF)		
A5 ,6	2D		G02-0574-04	LEAF SPRING (IC5,9)		
J5		*	J13-0071-05	FUSE HOLDER		
L1 ,2			L40-2782-48	SMALL FIXED INDUCTOR 0.27UF		
L3			L33-0695-05	CHOKE COIL 1MH		
L4 -6			L40-2292-48	SMALL FIXED INDUCTOR 2.2UH		
L7			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
L8			L40-3382-48	SMALL FIXED INDUCTOR 0.33UH		
L9			L40-2282-48	SMALL FIXED INDUCTOR 0.22UH		
L10 ,11			L40-4782-48	SMALL FIXED INDUCTOR 0.47UH		
L12			L33-0695-05	CHOKE COIL 1MH		
L13			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
L14			L40-6882-48	SMALL FIXED INDUCTOR 0.68UH		
L15 -17			L40-4782-48	SMALL FIXED INDUCTOR 0.47UH		
L18			L33-0695-05	CHOKE COIL 1MH		
L19			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
L20			L40-6882-48	SMALL FIXED INDUCTOR 0.68UH		
L24			L40-6882-48	SMALL FIXED INDUCTOR 0.68UH		
L25			L40-1092-48	SMALL FIXED INDUCTOR 1UH		
L26			L40-6882-48	SMALL FIXED INDUCTOR 0.68UH		
L27			L33-0695-05	CHOKE COIL 1MH		
L28			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
L29 ,30			L40-1092-48	SMALL FIXED INDUCTOR 1UH		
L31			L40-1292-48	SMALL FIXED INDUCTOR 1.2UH		
L32			L40-1092-48	SMALL FIXED INDUCTOR 1UH		
L33			L33-0695-05	CHOKE COIL 1MH		
L34			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
L35 -38			L40-1592-48	SMALL FIXED INDUCTOR 1.5UH		
L39			L33-0695-05	CHOKE COIL 1MH		
L40			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
L44			L40-2292-48	SMALL FIXED INDUCTOR 2.2UH		
L45			L40-1592-48	SMALL FIXED INDUCTOR 1.5UH		

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TX-RX UNIT (X57-3470-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
L46 ,47 L48 L49 L50 L51			L40-2292-48 L33-0695-05 L40-2211-48 L40-3392-48 L40-2292-48	SMALL FIXED INDUCTOR 2.2UH CHOKE COIL 1MH SMALL FIXED INDUCTOR 220UH SMALL FIXED INDUCTOR 3.3UH SMALL FIXED INDUCTOR 2.2UH		
L52 L53 ,54 L55 L56 L57			L40-2211-48 L33-0695-05 L40-6892-48 L40-4792-48 L33-0695-05	SMALL FIXED INDUCTOR 220UH CHOKE COIL 1MH SMALL FIXED INDUCTOR 6.8UH SMALL FIXED INDUCTOR 4.7UH CHOKE COIL 1MH		
L58 L59 L60 L64 L65			L40-2782-48 L40-2282-48 L39-0483-05 L40-1011-48 L34-4212-05	SMALL FIXED INDUCTOR 0.27UH SMALL FIXED INDUCTOR 0.22UH TOROIDAL COIL SMALL FIXED INDUCTOR 100UH COIL (71.295MHZ)		
L66 ,67 L68 L69 L70 L71			L34-4213-05 L34-4214-05 L34-4209-05 L34-4216-05 L30-0281-15	COIL (71.295MHZ) COIL (71.295MHZ) COIL (71.295MHZ) COIL (10.695MHZ) IFT (10.695MHZ)		
L72 -74 L75 L76 L77 ,78 L79			L40-4701-48 L15-0016-05 L40-1011-48 L40-4701-48 L30-0281-15	SMALL FIXED INDUCTOR 47UH LOW-FREQUENCY CHOKE COIL SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 47UH IFT (10.695MHZ)		
L80 L83 L84 L85 L86			L34-4217-05 L40-6892-48 L34-4218-05 L39-0432-05 L39-0483-05	COIL (71.295MHZ) SMALL FIXED INDUCTOR 6.8UH COIL (71.295MHZ) TOROIDAL COIL TOROIDAL COIL		
L87 L88 L89 L90 L91			L40-3382-48 L40-2782-48 L40-1092-48 L39-0483-05 L40-1011-48	SMALL FIXED INDUCTOR 0.33UH SMALL FIXED INDUCTOR 0.27UH SMALL FIXED INDUCTOR 1UH TOROIDAL COIL SMALL FIXED INDUCTOR 100UH		
L92 L93 L94 L95 L96			L40-1082-48 L40-8272-48 L40-5682-48 L34-0904-05 L40-1082-48	SMALL FIXED INDUCTOR 0.1UH SMALL FIXED INDUCTOR 82UH SMALL FIXED INDUCTOR 0.56UH COIL SMALL FIXED INDUCTOR 0.1UH		
L97 L99 ,100 L101 L106 L107			L40-2292-48 L34-4215-05 L34-2271-05 L40-1011-48 L33-0695-05	SMALL FIXED INDUCTOR 2.2UH COIL COIL SMALL FIXED INDUCTOR 100UH CHOKE COIL 1MH		
L108-116 L130 L131 X2 XF1		*	L40-1011-48 L40-2292-48 L40-1592-48 L77-1427-05 L71-0402-05	SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 2.2UH SMALL FIXED INDUCTOR 1.5UH CRYSTAL RESONATOR 30.3MHZ MCF (70.295MHZ)		
XF2 XF3			L71-0249-05 L71-0403-05	CRYSTAL FILTER SSB CRYSTAL FILTER AM		
M	2C,2D		N32-3006-41	FLAT HEAD MACHINE SCREW		

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R1			RK73FB2A471J	CHIP R 470 J 1/10W		
R2			RK73FB2A473J	CHIP R 47K J 1/10W		
R3			RK73FB2A101J	CHIP R 100 J 1/10W		
R4			RK73FB2A473J	CHIP R 47K J 1/10W		
R5			RK73FB2A101J	CHIP R 100 J 1/10W		
R6			RK73FB2A473J	CHIP R 47K J 1/10W		
R7			RK73FB2A101J	CHIP R 100 J 1/10W		
R8			RK73FB2A473J	CHIP R 47K J 1/10W		
R9			RK73FB2A101J	CHIP R 100 J 1/10W		
R10			RK73FB2A473J	CHIP R 47K J 1/10W		
R11			RK73FB2A101J	CHIP R 100 J 1/10W		
R12			RK73FB2A473J	CHIP R 47K J 1/10W		
R13			RK73FB2A101J	CHIP R 100 J 1/10W		
R14			RK73FB2A473J	CHIP R 47K J 1/10W		
R15			RK73FB2A101J	CHIP R 100 J 1/10W		
R17 ,18			RK73FB2A101J	CHIP R 100 J 1/10W		
R19			R92-0670-05	CHIP R 0 ΩHM		
R20			RK73FB2A473J	CHIP R 47K J 1/10W		
R21			RK73FB2A471J	CHIP R 470 J 1/10W		
R22 ,23			RK73FB2A681J	CHIP R 680 J 1/10W		
R24			RK73FB2A331J	CHIP R 330 J 1/10W		
R25			RK73FB2A471J	CHIP R 470 J 1/10W		
R26			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R27			RK73FB2A330J	CHIP R 33 J 1/10W		
R28 -32			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R33			RK73FB2A473J	CHIP R 47K J 1/10W		
R34			RK73FB2A104J	CHIP R 100K J 1/10W		
R35			RK73FB2A474J	CHIP R 470K J 1/10W		
R36			RK73FB2A471J	CHIP R 470 J 1/10W		
R37			RK73FB2A101J	CHIP R 100 J 1/10W		
R38			RK73FB2A471J	CHIP R 470 J 1/10W		
R39			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R40			RK73FB2A681J	CHIP R 680 J 1/10W		
R41 ,42			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R46			RK73FB2A681J	CHIP R 680 J 1/10W		
R47			RK73FB2A101J	CHIP R 100 J 1/10W		
R48			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R49			RK73FB2A103J	CHIP R 10K J 1/10W		
R50			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R51			RK73FB2A333J	CHIP R 33K J 1/10W		
R52			RK73FB2A104J	CHIP R 100K J 1/10W		
R53			RK73FB2A471J	CHIP R 470 J 1/10W		
R54			RK73FB2A104J	CHIP R 100K J 1/10W		
R55			RK73FB2A101J	CHIP R 100 J 1/10W		
R56			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R57			RK73FB2A471J	CHIP R 470 J 1/10W		
R58			RK73FB2A103J	CHIP R 10K J 1/10W		
R59			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R60 ,61			R92-0670-05	CHIP R 0 ΩHM		
R62 ,63			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R64			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R65			RK73FB2A101J	CHIP R 100 J 1/10W		
R66			RK73FB2A103J	CHIP R 10K J 1/10W		
R67			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R68			RK73FB2A102J	CHIP R 1.0K J 1/10W		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R69 ,70			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R71 ,72			RK73FB2A103J	CHIP R 10K J 1/10W		
R73 ,74			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R75			RK73FB2A101J	CHIP R 100 J 1/10W		
R76 ,77			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R78			RK73FB2A103J	CHIP R 10K J 1/10W		
R79 ,80			RK73FB2A471J	CHIP R 470 J 1/10W		
R86 ,87			RK73FB2A101J	CHIP R 100 J 1/10W		
R88 ,89			RK73FB2A153J	CHIP R 15K J 1/10W		
R90			RK73FB2A103J	CHIP R 10K J 1/10W		
R92			RK73FB2A103J	CHIP R 10K J 1/10W		
R93			RK73FB2A471J	CHIP R 470 J 1/10W		
R94			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R95			RK73FB2A123J	CHIP R 12K J 1/10W		
R96			RK73FB2A103J	CHIP R 10K J 1/10W		
R97			RK73FB2A224J	CHIP R 220K J 1/10W		
R98			RK73FB2A103J	CHIP R 10K J 1/10W		
R99			RK73FB2A564J	CHIP R 560K J 1/10W		
R100			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R101			RK73FB2A473J	CHIP R 47K J 1/10W		
R102			RK73FB2A123J	CHIP R 12K J 1/10W		
R103			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R104			RK73FB2A271J	CHIP R 270 J 1/10W		
R105			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R106			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R107			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R108			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R109			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R110			RK73FB2A333J	CHIP R 33K J 1/10W		
R111			RK73FB2A224J	CHIP R 220K J 1/10W		
R112			RK73FB2A104J	CHIP R 100K J 1/10W		
R113			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R114			RK73FB2A331J	CHIP R 330 J 1/10W		
R115			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R116			RK73FB2A153J	CHIP R 15K J 1/10W		
R117			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R118			RK73FB2A101J	CHIP R 100 J 1/10W		
R119			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R120			RK73FB2A333J	CHIP R 33K J 1/10W		
R126			RK73FB2A103J	CHIP R 10K J 1/10W		
R127,128			RK73FB2A473J	CHIP R 47K J 1/10W		
R129			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R130			RK73FB2A223J	CHIP R 22K J 1/10W		
R131-134			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R135			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R136			RK73FB2A104J	CHIP R 100K J 1/10W		
R137			RK73FB2A223J	CHIP R 22K J 1/10W		
R138			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R139			RK73FB2A471J	CHIP R 470 J 1/10W		
R140			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R141			RK73FB2A471J	CHIP R 470 J 1/10W		
R142			RK73FB2A101J	CHIP R 100 J 1/10W		
R143			RK73FB2A104J	CHIP R 100K J 1/10W		
R144			RK73FB2A473J	CHIP R 47K J 1/10W		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R145			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R146			RK73FB2A151J	CHIP R 150 J 1/10W		
R147, 148			RK73FB2A471J	CHIP R 470 J 1/10W		
R149			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R150			RK73FB2A101J	CHIP R 100 J 1/10W		
R151			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R152, 153			RK73FB2A224J	CHIP R 220K J 1/10W		
R154, 155			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R156			RK73FB2A471J	CHIP R 470 J 1/10W		
R157			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R158			RK73FB2A471J	CHIP R 470 J 1/10W		
R159			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R160			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R165			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R166			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R167			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R168			RK73FB2A103J	CHIP R 10K J 1/10W		
R169			RK73FB2A223J	CHIP R 22K J 1/10W		
R170			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R171			RK73FB2A101J	CHIP R 100 J 1/10W		
R172			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R173-175			RK73FB2A103J	CHIP R 10K J 1/10W		
R176			RK73FB2A471J	CHIP R 470 J 1/10W		
R177			RK73FB2A103J	CHIP R 10K J 1/10W		
R178			RK73FB2A101J	CHIP R 100 J 1/10W		
R179			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R180			RK73FB2A563J	CHIP R 56K J 1/10W		
R181			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R182			RK73FB2A333J	CHIP R 33K J 1/10W		
R183			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R185			RK73FB2A103J	CHIP R 10K J 1/10W		
R186			RK73FB2A154J	CHIP R 150K J 1/10W		
R187			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R188			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R189			RK73FB2A391J	CHIP R 390 J 1/10W		
R190			RK73FB2A681J	CHIP R 680 J 1/10W		
R191			RK73FB2A471J	CHIP R 470 J 1/10W		
R192-194			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R195			RK73FB2A471J	CHIP R 470 J 1/10W		
R196			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R197			RK73FB2A101J	CHIP R 100 J 1/10W		
R198			RK73FB2A391J	CHIP R 390 J 1/10W		
R199			RK73FB2A101J	CHIP R 100 J 1/10W		
R200			RK73FB2A471J	CHIP R 470 J 1/10W		
R206			RK73FB2A221J	CHIP R 220 J 1/10W		
R207			RK73FB2A103J	CHIP R 10K J 1/10W		
R208-211			RK73FB2A330J	CHIP R 33 J 1/10W		
R212, 213			RK73FB2A104J	CHIP R 100K J 1/10W		
R214			RK73FB2A101J	CHIP R 100 J 1/10W		
R215			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R216			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R217			RK73FB2A561J	CHIP R 560 J 1/10W		
R218			RK73FB2A681J	CHIP R 680 J 1/10W		
R219			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R220			RK73FB2A100J	CHIP R 10 J 1/10W		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R221			RK73FB2A680J	CHIP R 68 J 1/10W		
R222			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R223			RK73FB2A681J	CHIP R 680 J 1/10W		
R224			RK73FB2A220J	CHIP R 22 J 1/10W		
R225			RK73FB2A221J	CHIP R 220 J 1/10W		
R226			RK73FB2A330J	CHIP R 33 J 1/10W		
R227			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R228			RK73FB2A151J	CHIP R 150 J 1/10W		
R230			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R231			RK73FB2A334J	CHIP R 330K J 1/10W		
R232, 233			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R234			RK73FB2A334J	CHIP R 330K J 1/10W		
R235			RK73FB2A221J	CHIP R 220 J 1/10W		
R236			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R237			RK73FB2A103J	CHIP R 10K J 1/10W		
R238			RK73FB2A471J	CHIP R 470 J 1/10W		
R240			RK73FB2A101J	CHIP R 100 J 1/10W		
R246			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R247			RK73FB2A221J	CHIP R 220 J 1/10W		
R248			RK73FB2A223J	CHIP R 22K J 1/10W		
R249			RK73FB2A683J	CHIP R 68K J 1/10W		
R250			RK73FB2A473J	CHIP R 47K J 1/10W		
R251			RK73FB2A223J	CHIP R 22K J 1/10W		
R252			RK73FB2A473J	CHIP R 47K J 1/10W		
R253			RK73FB2A333J	CHIP R 33K J 1/10W		
R254, 255			RK73FB2A104J	CHIP R 100K J 1/10W		
R256			RK73FB2A223J	CHIP R 22K J 1/10W		
R257			RK73FB2A153J	CHIP R 15K J 1/10W		
R258			RK73FB2A224J	CHIP R 220K J 1/10W		
R259			RK73FB2A474J	CHIP R 470K J 1/10W		
R260			RK73FB2A223J	CHIP R 22K J 1/10W		
R261			RK73FB2A104J	CHIP R 100K J 1/10W		
R262, 263			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R264			RK73FB2A101J	CHIP R 100 J 1/10W		
R265			RK73FB2A334J	CHIP R 330K J 1/10W		
R266			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R267			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R268			RK73FB2A103J	CHIP R 10K J 1/10W		
R269			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R270-272			RK73FB2A103J	CHIP R 10K J 1/10W		
R273			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R274, 275			RK73FB2A103J	CHIP R 10K J 1/10W		
R276-279			RK73FB2A471J	CHIP R 470 J 1/10W		
R280			RK73FB2A153J	CHIP R 15K J 1/10W		
R286, 287			RK73FB2A471J	CHIP R 470 J 1/10W		
R289			RK73FB2A471J	CHIP R 470 J 1/10W		
R291-296			RK73FB2A471J	CHIP R 470 J 1/10W		
R297			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R320			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R321			RK73FB2A223J	CHIP R 22K J 1/10W		
R322			RK73FB2A103J	CHIP R 10K J 1/10W		
R323			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R324			RK73FB2A473J	CHIP R 47K J 1/10W		
R325			RK73FB2A223J	CHIP R 22K J 1/10W		
R326			RK73FB2A222J	CHIP R 2.2K J 1/10W		

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R327			RK73FB2A101J	CHIP R 100 J 1/10W		
VR3			R12-6475-05	TRIMMING POT.47K		
VR4			R12-6471-05	TRIMMING POT.10K		
VR5			R12-3126-05	TRIMMING POT.10K		
VR6 -8			R12-6475-05	TRIMMING POT.47K		
VR9			R12-3126-05	TRIMMING POT.10K		
VR10			R12-6471-05	TRIMMING POT.10K		
VR11			R12-6465-05	TRIMMING POT.1K		
VR12,13			R12-6471-05	TRIMMING POT.10K		
VR14,15			R12-6475-05	TRIMMING POT.47K		
VR17			R12-6477-05	TRIMMING POT.100K		
VR18			R12-6473-05	TRIMMING POT.22K		
VR19,20			R12-6471-05	TRIMMING POT.10K		
VR21			R12-3132-05	TRIMMING POT.47K		
VR22			R05-3443-05	POTENTIOMETER 10K DELEY		
K1			S51-1428-05	RELAY		
D1			V08(G)	DIODE		
D2			RLS245	CHIP DIODE		
D3			V08(G)	DIODE		
D4			RLS245	CHIP DIODE		
D5 -20			RLS135	CHIP DIODE		
D21 ,22			1SS226	CHIP DIODE		
D24 -30			1SS268	CHIP DIODE		
D31 ,32			1SS184	CHIP DIODE		
D33			1SS268	CHIP DIODE		
D34 -36			1SS184	CHIP DIODE		
D37 ,38			1SS181	CHIP DIODE		
D39			DLS1585	CHIP DIODE		
D40			1SS184	CHIP DIODE		
D44 ,45			1SS184	CHIP DIODE		
D46			02CZ9.1(X,Y)	CHIP ZENER DIODE(9.1V)		
D47			RLS245	CHIP DIODE		
D48			DLS1585	CHIP DIODE		
D49 -51			1SS184	CHIP DIODE		
D52 -54			DLS1585	CHIP DIODE		
D55 -58			1SS184	CHIP DIODE		
D59 ,60			DLS1585	CHIP DIODE		
D64 -66			1SS184	CHIP DIODE		
D67 ,68			1SS268	CHIP DIODE		
D69 -72			1SS184	CHIP DIODE		
D73			02CZ6.2(Y,Z)	CHIP ZENER DIODE(6.2V)		
D74			02CZ5.1X,Y	CHIP ZENER DIODE(5.1V)		
D75			1SS184	CHIP DIODE		
IC1			KCX01	IC(NB HIC)		
IC2			KCD03	IC(IF HIC)		
IC3			KCX02	IC(SQL HIC)		
IC4			NJM2904M	IC(OP AMP)		
IC5			UPC1242H	IC(AF POWER AMP)		
IC6			UPC1037HA	IC(DUBBLE BALANCE MODULATOR)		
IC7			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC8			NJM2904M	IC(OP AMP)		
IC9 ,10			TC9174F	IC(CMOS I/O)		

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TX-RX UNIT (X57-3470-21)

VCO (X58-3720-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
IC11 Q1 -8 Q9 ,10 Q11 Q12		*	UPC78M08H DTB143EK 2SK125-5 FMC3 3SK131(M)	IC(8V AVR) DIGITAL TRANSISTOR FET DIGITAL TRANSISTOR CHIP FET		
Q13 ,14 Q15 Q16 Q17 -19 Q20			2SK520(K44) 3SK131(M) 2SC2712(Y) DTC114EK DTA114EK	CHIP FET CHIP FET CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q21 Q24 Q25 Q26 Q27			DTC114EK FMC3 DTA114EK FMC3 DTC114EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q28 Q29 Q30 Q31 ,32 Q33 ,34			DTA114EK 2SC3324(G) 2SD1757(K) DTC114EK 2SC2712(Y)	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q35 Q36 Q37 ,38 Q39 Q40			DTD143EK 2SC3649(S,T) 2SC3324(G) DTC114EK DTA114EK	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q44 Q45 Q46 Q47 Q48			DTC114EK 3SK131(M) 2SC2712(Y) 2SA1162(Y) DTA114EK	DIGITAL TRANSISTOR CHIP FET CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q49 Q50 -52 Q53 ,54 Q55 -57 Q58			2SC2714(Y) 3SK179(L) 2SC2053 2SC2714(Y) DTC114EK	CHIP TRANSISTOR CHIP FET TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q59 Q60 Q64 Q65 Q66			2SC2712(Y) 2SA1213(Y) 2SC2712(Y) DTC114EK 2SA1213(Y)	CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q67 Q68 Q90 ,91 TH1 TH2			2SC2712(Y) DTC114EK 2SC2714(Y) 112-502-2 112-103-2	CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR THERMISTOR 5K THERMISTOR 10K		
TH3 TH4			112-502-2 112-501-2	THERMISTOR 5K THERMISTOR 500		
Z1 Z2			X59-1100-00 X59-1060-00	MODULE UNIT (DC-DC) MODULE UNIT (SIDE TONE)		
VCO (X58-3720-10)						
C1 C2 C3 C4			CK73FB1H102K CC73FCH1H330J CC73FCH1H100D CC73FCH1H010C	CHIP C 1000PF K CHIP C 33PF J CHIP C 10PF D CHIP C 1.0PF C		

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VCO (X58-3270-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C5			CC73FCH1H100D	CHIP C 10PF D		
C6			CC73FCH1H200J	CHIP C 20PF J		
C7			CC73FCH1H120J	CHIP C 12PF J		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CC73FCH1H050C	CHIP C 5.0PF C		
C10 ,11			CK73FB1H102K	CHIP C 1000PF K		
C12			CC73FCH1H270J	CHIP C 27PF J		
C13			CC73FCH1H100D	CHIP C 10PF D		
C14			CC73FCH1H020C	CHIP C 2.0PF C		
C15			CC73FCH1H090D	CHIP C 9.0PF D		
C16			CC73FCH1H180J	CHIP C 18PF J		
C17			CC73FCH1H090D	CHIP C 9.0PF D		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CC73FCH1H050C	CHIP C 5.0PF C		
C20 ,21			CK73FB1H102K	CHIP C 1000PF K		
C22			CC73FCH1H240J	CHIP C 24PF J		
C23			CC73FCH1H100D	CHIP C 10PF D		
C25			CC73FCH1H080D	CHIP C 8.0PF D		
C26			CC73FCH1H160J	CHIP C 16PF J		
C27			CC73FCH1H120J	CHIP C 12PF J		
C28			CK73FB1H102K	CHIP C 1000PF K		
C29			CC73FCH1H050C	CHIP C 5.0PF C		
C30 ,31			CK73FB1H102K	CHIP C 1000PF K		
C32			CC73FCH1H240J	CHIP C 24PF J		
C33			CC73FCH1H100D	CHIP C 10PF D		
C35			CC73FCH1H070D	CHIP C 7.0PF D		
C36			CC73FCH1H120J	CHIP C 12PF J		
C37			CC73FCH1H080D	CHIP C 8.0PF D		
C38			CK73FB1H102K	CHIP C 1000PF K		
C39			CC73FCH1H050C	CHIP C 5.0PF C		
C40 -48			CK73FB1H102K	CHIP C 1000PF K		
TC1 -4			C05-0345-05	TRIMMING CAP 10PF		
CN1			E40-5211-05	PIN CONNECTOR		
A1			F10-1419-04	SHIELDING PLATE		
A2			F10-1420-04	SHIELDING PLATE		
A3			G13-0954-04	FORMED PLATE		
L1			L33-0729-05	CHOKE COIL		
L2			L34-2360-05	COIL		
L3			L33-0729-05	CHOKE COIL		
L4			L34-2359-05	COIL		
L5			L33-0729-05	CHOKE COIL		
L6			L34-2359-05	COIL		
L7			L33-0729-05	CHOKE COIL		
L8			L34-2358-05	COIL		
			N30-2604-41	PAN HEAD MACHINE SCREW		
R1			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R2			RK73FB2A271J	CHIP R 270 J 1/10W		
R3			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R4			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R5			RK73FB2A271J	CHIP R 270 J 1/10W		
R6			RK73FB2A332J	CHIP R 3.3K J 1/10W		

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VCO (X58-3270-10)

SIDE TONE (X59-1060-00)

DC-DC (X59-1100-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R7			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R8			RK73FB2A271J	CHIP R 270 J 1/10W		
R9			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R10			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R11			RK73FB2A271J	CHIP R 270 J 1/10W		
R12			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R13 ,14			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R15			RK73FB2A560J	CHIP R 56 J 1/10W		
R16			RK73FB2A471J	CHIP R 470 J 1/10W		
R17			RK73FB2A332J	CHIP R 3.3K J 1/10W		
D1			1SV166	CHIP DIODE		
D2			RLS135	CHIP DIODE		
D3			1SV166	CHIP DIODE		
D4			RLS135	CHIP DIODE		
D5			1SV166	CHIP DIODE		
D6			RLS135	CHIP DIODE		
D7			1SV166	CHIP DIODE		
D8			RLS135	CHIP DIODE		
Q1			2SK508NV(K52)	CHIP FET		
Q2			DTC114EK	DIGITAL TRANSISTOR		
Q3			2SK508NV(K52)	CHIP FET		
Q4			DTC114EK	DIGITAL TRANSISTOR		
Q5			2SK508NV(K52)	CHIP FET		
Q6			DTC114EK	DIGITAL TRANSISTOR		
Q7			2SK508NV(K52)	CHIP FET		
Q8			DTC114EK	DIGITAL TRANSISTOR		
Q9			2SC2714(Y)	CHIP TRANSISTOR		
SIDE TONE (X59-1060-00)						
C1			CK73FB1E223K	CHIP C 0.022UF K		
C2 -5			CK73FB1H123K	CHIP C 0.012UF K		
C6 -8			CK73FB1E223K	CHIP C 0.022UF K		
			E23-0471-05	TERMINAL		
R1 ,2			RK73FB2A823J	CHIP R 82K J 1/10W		
R3			RK73FB2A223J	CHIP R 22K J 1/10W		
R4			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R5			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R6			RK73FB2A103J	CHIP R 10K J 1/10W		
R7 ,8			RK73FB2A333J	CHIP R 33K J 1/10W		
R9			RK73FB2A103J	CHIP R 10K J 1/10W		
R10			RK73FB2A333J	CHIP R 33K J 1/10W		
R11			RK73FB2A183J	CHIP R 18K J 1/10W		
W1 -6			R92-0670-05	CHIP R 0 OHM		
D1			DAN202(K)	CHIP DIODE		
D2			DAP202(K)	CHIP DIODE		
D3			DAN202(K)	CHIP DIODE		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
DC-DC (X59-1100-00)						
C1 ,2			CK73FB1H222K	CHIP C 2200PF K		
			E23-0471-05	TERMINAL		
JR1 -3			R92-0670-05	CHIP R 0 OHM		
R1			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R2 ,3			RK73FB2A223J	CHIP R 22K J 1/10W		

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DC-DC (X59-1100-00)

FAN & TEMP PROTECTION (X59-3370-00)


VCO (X59-3440-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R4 R5			RK73FB2A473J RK73FB2A471J	CHIP R 47K J 1/10W CHIP R 470 J 1/10W		
D1 Q1 ,2 Q3			1SS226 2SC2712(Y) 2SA1162(Y)	CHIP DIODE CHIP TRANSISTOR CHIP TRANSISTOR		
<b>FAN &amp; TEMP PROTECTION (X59-3370-00)</b>						
C1			CK73FB1H103K E23-0471-05	CHIP C 0.010UF K TERMINAL		
R1 R2 R3 R4 R5			RK73FB2A103J RK73FB2A223J RK73FB2A562J RK73FB2A681J RK73FB2A562J	CHIP R 10K J 1/10W CHIP R 22K J 1/10W CHIP R 5.6K J 1/10W CHIP R 680 J 1/10W CHIP R 5.6K J 1/10W		
R6 R7 R8 R9 W1 -2			RK73FB2A332J RK73FB2A562J RK73FB2A223J R92-0670-05 R92-0670-05	CHIP R 3.3K J 1/10W CHIP R 5.6K J 1/10W CHIP R 22K J 1/10W CHIP R 0 OHM CHIP R 0 OHM		
IC1 Q1			NJM2904M DTD123EK	IC(OP AMP X2) DIGITAL TRANSISTOR		
<b>VCO (X59-3440-00)</b>						
C1 C2 C3 C4			CC73FCH1H080D CK73FB1H102K CC73FCH1H030C CK73FB1H103K	CHIP C 8.0PF D CHIP C 1000PF K CHIP C 3.0PF C CHIP C 0.010UF K		
			E23-0471-05	TERMINAL		
L1			L40-1011-48	SMALL FIXED INDUCTOR 100UF		
R1 R2 R3 R4 R5			RK73FB2A334J RK73FB2A151J RK73FB2A330J RK73FB2A224J RK73FB2A470J	CHIP R 330K J 1/10W CHIP R 150 J 1/10W CHIP R 33 J 1/10W CHIP R 220K J 1/10W CHIP R 47 J 1/10W		
R6 R7			RK73FB2A101J RK73FB2A102J	CHIP R 100 J 1/10W CHIP R 1.0K J 1/10W		
Q1 Q2			2SK210(GR) 2SC2714(Y)	CHIP FET CHIP TRANSISTOR		

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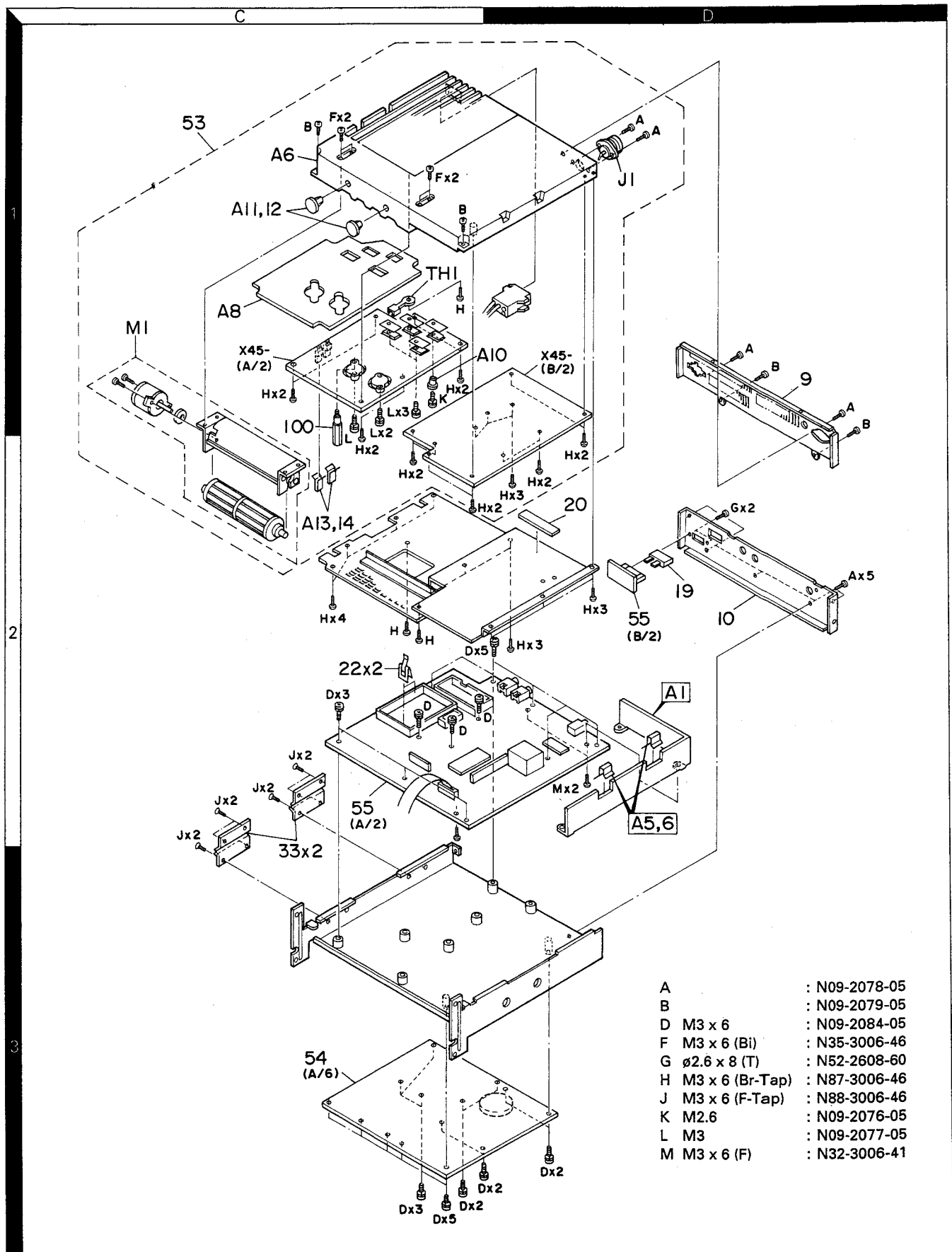
U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

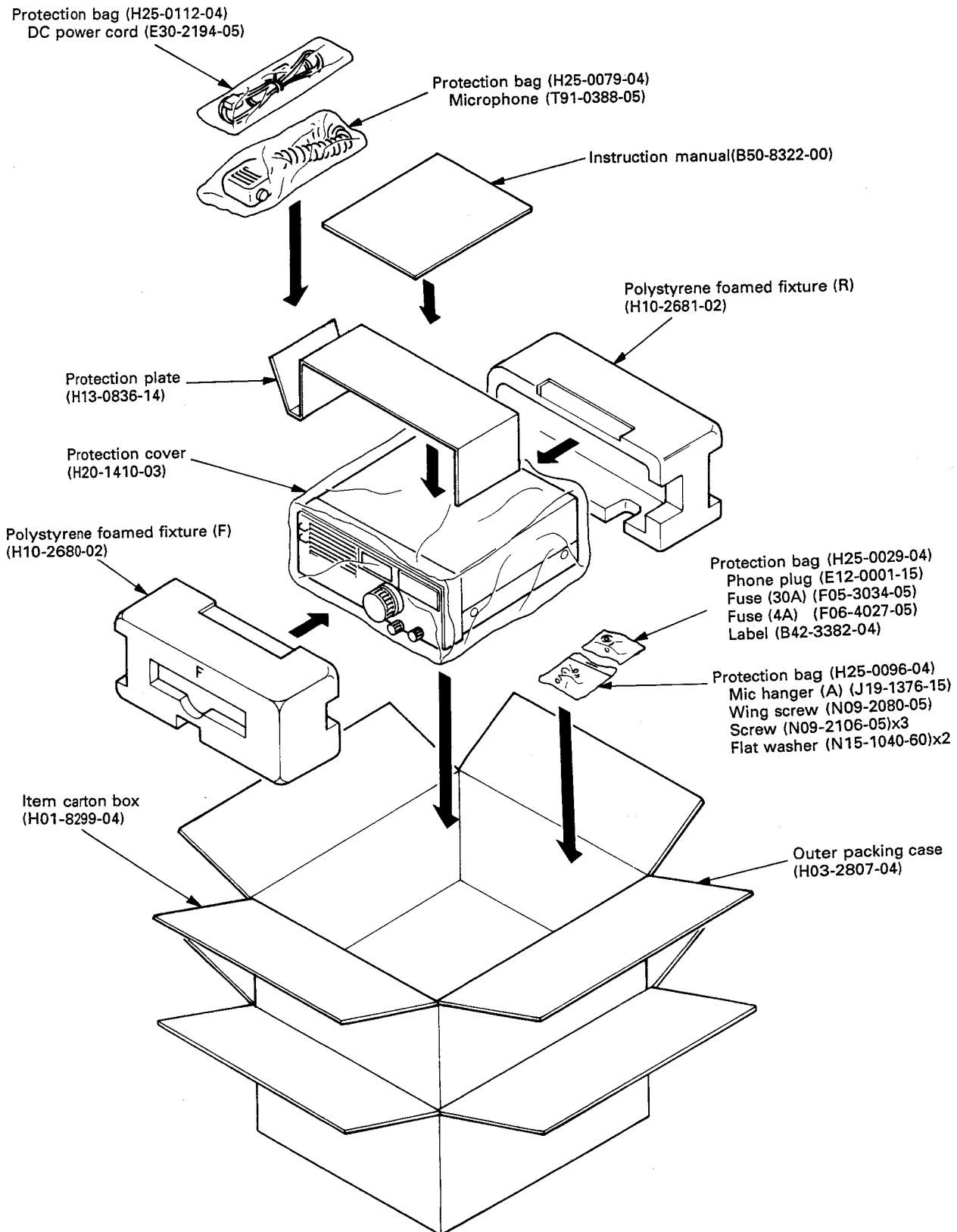
 indicates safety critical components.



## EXPLODED VIEW



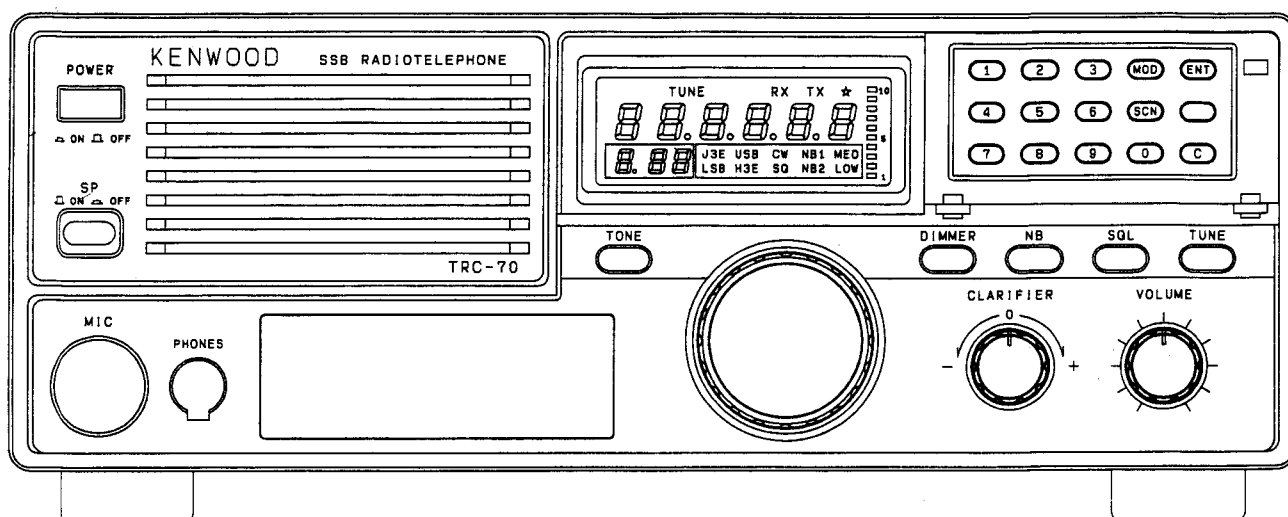
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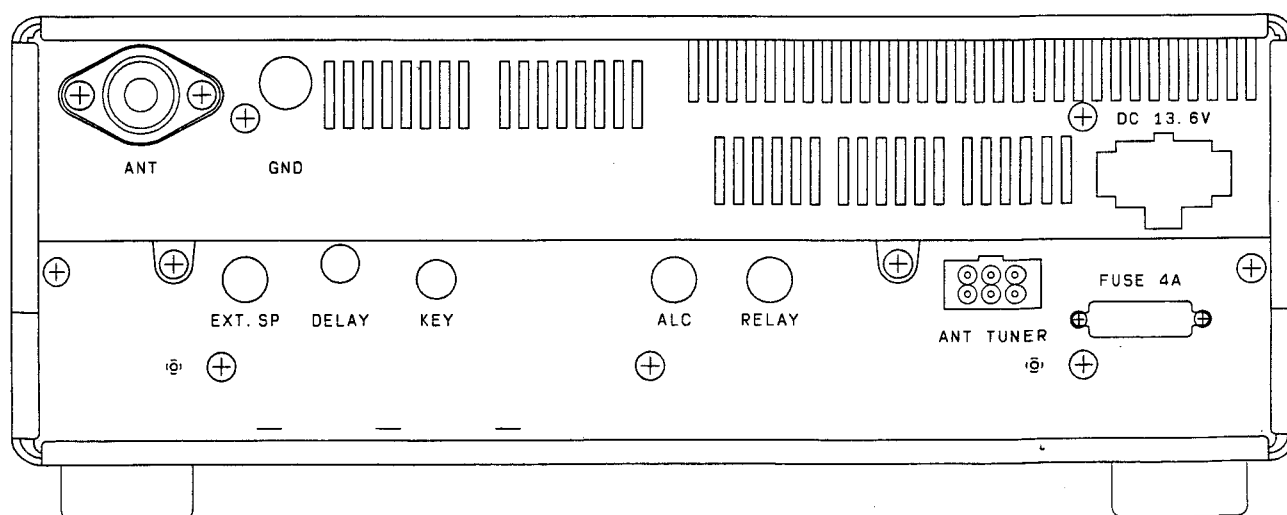
# TRC-70

## ADJUSTMENT

### Front Panel



### Rear Panel



## ADJUSTMENT

### Precautions

The inherent quality of the solid-state components used in this transceiver provides many years of continuous use. Take the following precautions to prevent damage to the transceiver.

- Never key the transmitter unless an antenna or suitable dummy load is connected to the transceiver's antenna receptacle.
- Ensure that the input voltage does not exceed 16V DC or fall below 11V DC.

### Test Applications

- Performance test : conducted to check overall transceiver operation. This should be performed before transceiver sale/installation.
- Alignment : conducted if the transceiver fails the performance test or if a critical electrical component has been replaced. KENWOOD recommends that alignment be performed whenever maintenance is performed.

### Test Equipment

The following test equipment, or its equivalent, is necessary for TRC-70 maintenance.

### Test Equipment Required for Alignment

No.	Test Equipment	Major Specifications
1	Standard Signal Generator (SSG)	Frequency Range Modulation Output 0.5 to 30 MHz. AM or external modulation. 0.1 $\mu$ V to greater than 1 mV.
2	Power Meter	Input Impedance Operation Frequency Measurement Capability 50 $\Omega$ . 0.5 to 30 MHz or more. Vicinity 200 W.
3	Directional coupler	Operation Frequency 0.5 to 30 MHz.
4	Digital Volt Meter (DVM)	Measuring Range Accuracy 20V DC. High input impedance for minimum circuit loading.
5	Oscilloscope	DC through 30 MHz.
6	High Sensitivity Frequency Counter	Frequency Range Frequency Stability 10 Hz to 100 MHz. 0.2 ppm or less.
7	Ammeter	30A.
8	AF Volt Meter (AF VTVM)	Frequency Range Voltage Range 50 Hz to 10 kHz. 3 mV to 3 V.
9	Audio Generator (AG) QTY : 2	Frequency Range Output 50 Hz to 5 kHz or more. 1 and 1 V.
10	RF Volt Meter (RF VTVM)	Frequency Range Voltage Range Impedance 10 kHz to 500 MHz. 10 mV to 300 V. 1 M $\Omega$ and less than 3 pF, min.
11	Voltmeter	Measuring Range Input Impedance 10 to 1.5 V DC or less. 50 k $\Omega$ /V or greater.
12	Dummy Load	Approx. 4 $\Omega$ , 5 W.
13	Regulated Power Supply	13.6 V approx. 30 A (adjustable from 11 to 16 V). Useful if ammeter equipped.





## ADJUSTMENT

### Preparations

1. Remove the screws from the top and bottom of the case to expose the bottom of the set. (The control unit (x53-3280-21) can be seen.)
2. Check that the POWER switch is set to OFF.
3. Change DIP switch S301's No.1 of the control unit from ON to OFF. (The operation mode changes from the user mode to the dealer mode.)



Indicates the switch setting position (OFF).

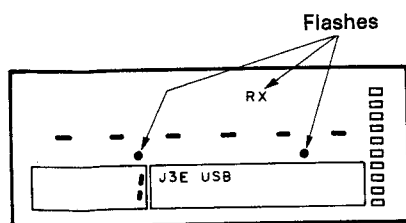
4. Set the POWER switch to ON while holding the ENT key down. (Microcomputer reset)
5. Write the receive and transmit frequencies to the memory channel as follows:

Memorize the required receive and transmit frequencies on the memory channel during adjustment. Memorized frequencies and modes are as follows:

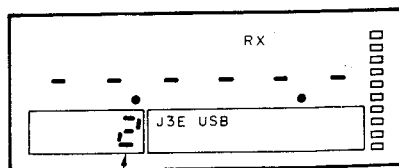
0.100.0 MHz	USB	4.100.0 MHz	CW
2.099.0 MHz	CW	7.000.0 MHz	USB
2.100.0 MHz	USB	14.000.0 MHz	USB
2.100.0 MHz	CW	22.000.0 MHz	USB
2.100.0 MHz	H3E		

Write the memory in the following order:

- 1) Press the ENT key to enter the memory entry mode. A vacant channel display is shown below.

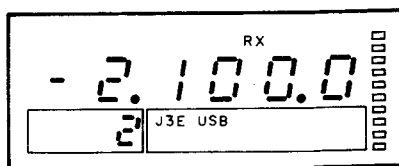


- 2) Rotate the channel selector to select the desired memory channel (vacant channel) on which no frequency has been memorized.

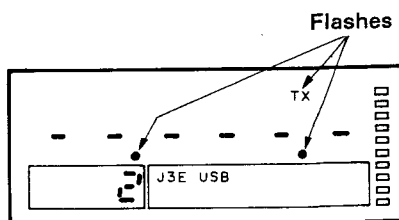


Rotate the channel selector until the desired memory channel appears.

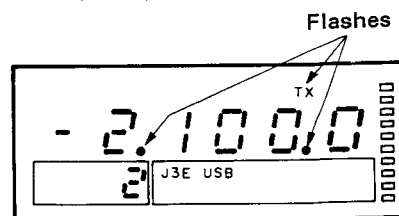
- 3) Enter the receive frequency sequentially from the high-order digit from the numeric keypad. Example: When memorizing 2.100.0 MHz, enter 2, 1, 0, 0, 0 in this sequence.



- 4) Press the MOD key to set the desired USB mode.
- 5) Press the ENT key to store the RX data into the selected memory channel.
- 6) The display panel is shown below.



- 7) Enter the transmit frequency sequentially from the high-order digit from the numeric keypad. Enter the same 2.100.0 MHz frequency as the receive frequency.



- 8) Press the ENT key.

Writing the 2.100.0 MHz frequency and USB mode to a certain memory channel is completed. Write other frequencies and modes to vacant channels in the same way as the above.

## ADJUSTMENT

### PLL Adjustment

#### 1. PLL C-Loop (carrier) Check and Adjustment

##### 1-1. Voltage-controlled oscillator (VCO) check

1. Connect a digital voltmeter to the TP4 terminal of the control unit.
2. Turn the channel selector and read the selected 2.100.0 MHz USB.
3. Check that the display frequency is 2.100.0 USB and that the voltage is 3 to 5 V.
4. Set the mode to 2.100.0 LSB with the MOD key. Check that the voltage is 0.3 to 0.5 V lower than the USB voltage.

##### 1-2. Output level adjustment

1. Connect an RF voltmeter to the TP5 terminal of the control unit.
2. Turn L32's core of the control unit in the direction in which it is inserted until the output becomes 0.35 Vrms. (Specification:  $0.35 \pm 0.03$  Vrms)

#### 2. Clarifier Adjustment

1. Set the clarifier control on the front panel to the center click position.
2. Turn VR303 of the control unit until symbol ★ on the LCD display disappears.
3. Check that the same width to center clock position of clarifier control when clarifier control is turned right and left position. (Until symbol ★ on the LCD display disappears.)

#### 3. PLL B-Loop Check

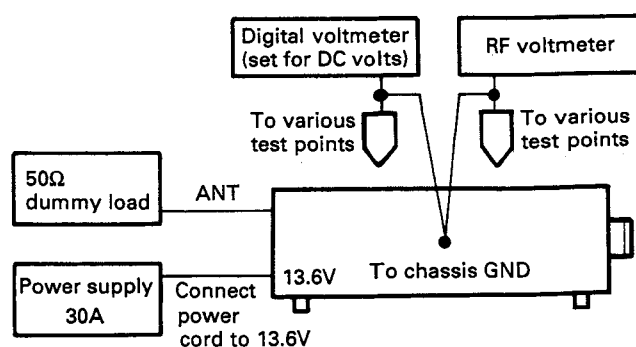
1. Connect a digital voltmeter to the TP2 terminal of the control unit.
2. Set that the memorizing frequency is 2.100.0 MHz, the mode is USB.
3. Check that the voltage at TP2 is 1.5 to 3.0 V.
4. Set that the memorizing frequency is 2.099.9 MHz, the mode is USB.
5. Check that the voltage at TP2 is 5.5 to 7.0 V.

#### 4. PLL MCF Adjustment

1. Connect an RF voltmeter to the TP3 terminal of the control unit.
2. Alternately turn L25 and L26 of the control unit until they are maximum. (Specification: 30 to 40 mV)

#### 5. PLL A-Loop Check

1. Connect a digital voltmeter to the TP1 terminal of the control unit.
2. Set that the memorizing frequency is 22.000.0 MHz, the mode is USB.
3. Check that the voltage at TP1 is 1.5 to 2.5V. If the voltage at TP1 is unable to 1.5 to 2.5V, adjustment are as follows :  
Enter 29.999.9 MHz from the numeric keypad, then press the ENT key.  
Press the MOD key to enter the USB mode.  
Turn TC4 of the X58-3720-10 in the control unit until the voltage is  $6.5 \pm 0.1$ V.
4. Set that the memorizing frequency is 14.000.0 MHz, the mode is USB.
5. Check that the voltage at TP1 is 1.5 to 2.5V. If the voltage at TP1 is unable to 1.5 to 2.5V, adjustment are as follows :  
Enter 21.999.9 MHz from the numeric keypad, then press the ENT key.  
Press the MOD key to enter the USB mode.  
Turn TC3 of the X58-3720-10 in the control unit until the voltage is  $6.5 \pm 0.1$ V.
6. Set that the memorizing frequency is 7.000.0 MHz, the mode is USB.
7. Check that the voltage at TP1 is 1.5 to 2.5V. If the voltage at TP1 is unable to 1.5 to 2.5V, adjustment are as follows :  
Enter 13.999.9 MHz from the numeric keypad, then press the ENT key.  
Press the MOD key to enter the USB mode.  
Turn TC2 of the X58-3720-10 in the control unit until the voltage is  $6.5 \pm 0.1$ V.
8. Set that the memorizing frequency is 0.100.0 MHz, the mode is USB.
9. Check that the voltage at TP1 is 1.5 to 2.5V. If the voltage at TP1 is unable to 1.5 to 2.5V, adjustment are as follows :  
Enter 6.999.9 MHz from the numeric keypad, then press the ENT key.  
Press the MOD key to enter the USB mode.  
Turn TC1 of the X58-3720-10 in the control unit until the voltage is  $6.5 \pm 0.1$ V.



## ADJUSTMENT

### Receiver Adjustment

#### 1. Second HET Adjustment (HET2: 60.6 MHz)

1. Connect an RF voltmeter to the TP4 terminal of the TX-RX unit.
2. Turn the TC1 of the TCXO unit until the frequency is within 60.600.0 MHz  $\pm$  50 Hz.
3. Turn L101 of the TX-RX unit until the peak level is 0.45 to 0.65 Vrms.

#### 2. Reference Frequency Check

1. Connect a frequency counter to the TP4 terminal of the TX-RX unit.
2. Check that the frequency is within 60.600.0 MHz  $\pm$  40 Hz.

**Note :** Adjust the frequency when the frequency counter power switch is turned on after warm-up 10 minutes later.

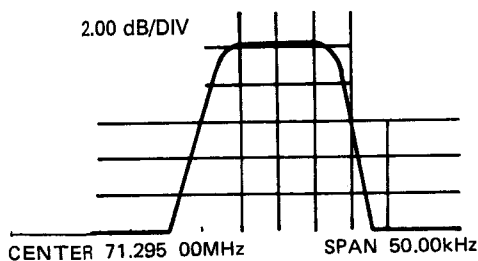
#### 3. MCF Adjustment

1. Connect a tracking generator to the TP1 terminal of the TX-RX unit.
2. Connect a spectrum analyzer to the TP2 terminal of the TX-RX unit.
3. Remove coaxial cable connector CN2 (HET) from the TX-RX unit.

Spectrum analyzer specifications:

Center frequency	71.295 MHz
Span	50 kHz
Reference level	-30 dBm
TG level	-20 dBm, 2 dB/div

4. Adjust the waveforms and gain in the order of L65, L68, L67, and L66 of the TX-RX unit.  
Set the L66's core always inside.



#### 4. Receiving Amplifier Adjustment

1. Connect SSG to the ANT terminal.
2. Connect an AF voltmeter, an oscilloscope, and a 4 $\Omega$  dummy load to the EXT. SP terminal.

SSG specifications:

Receiving frequency	2.101.0 MHz
Level	-113 dBm (0.5 $\mu$ V)
Mode	CW

3. Set that the memorizing frequency is 2.100.0 MHz, the mode is USB.
4. Turn the two IFTs of the TX-RX unit IC2, and turn L69, L70, and L71 of the TX-RX unit until the AF output is maximum.

#### 5. S-meter Adjustment

1. Connect SSG to the ANT terminal.
2. Connect a digital voltmeter to the TP5 terminal of the TX-RX unit.

SSG specifications:

Receiving frequency	2.101.0 MHz
Level	RF OUT OFF
Mode	CW

3. Set that the memorizing frequency is 2.100.0 MHz, the mode is USB.

##### 5-1. S-meter zero-point adjustment (S-0)

1. Turn VR3 of the TX-RX unit until the voltage at the TP5 terminal is 0.1 V (Specification: 0.1 V  $\pm$  0.02 V)

##### 5-2. S-meter eight-point adjustment (S-8)

SSG specifications:

Receiving frequency	2.101.0 MHz
Level	-73 dBm (50 $\mu$ V)

1. Set that the memorizing frequency is 2.100.0 MHz, the mode is USB.
2. Turn VR4 of the TX-RX unit until the LCD on the panel indicates that a "9-point bar indicator" goes off.

##### 5-3. S-meter one-point adjustment (S-1)

SSG specifications:

Receiving frequency	2.101.0 MHz
Level	-103 dBm (1.58 $\mu$ V)

1. Set that the memorizing frequency is 2.100.0 MHz, the mode is USB.
2. Turn the VR control of the TX-RX unit IC2 until the LCD on the panel indicates that a "1-point bar indicator" goes on.

## ADJUSTMENT

### 5-4. Zero- and eight-point checks

1. Set that the memorizing frequency is 2.100.0 MHz, the mode is USB, and the SSG frequency is 2.101.0 MHz.

#### • SSG level: RF OUT OFF

1. Check that the voltage at the TP5 terminal of the TX-RX unit is 0.08 to 0.15 V.

#### • SSG level: -73 dBm (50 $\mu$ V)

1. Check that the LCD on the panel indicates a "8-point bar" indicator goes on.

**Note:** If the checks in steps 5-4 are incorrect, make the adjustments outlined in steps 5-1 through 5-3 again.

### 6. NB Adjustment

1. Connect SSG to the ANT terminal.
2. Connect an analog voltmeter to the TP3 terminal of the TX-RX unit.

SSG specifications:

Frequency	2.101.0 MHz
Level	-93 dBm (5 $\mu$ V)

Set that the memorizing frequency is 2.100.0 MHz and that the mode is USB.

3. Turn the two IFTs of the TX-RX unit IC1 until the voltage at the TP3 terminal is minimum. (Reference level: Approx. 3.25V)

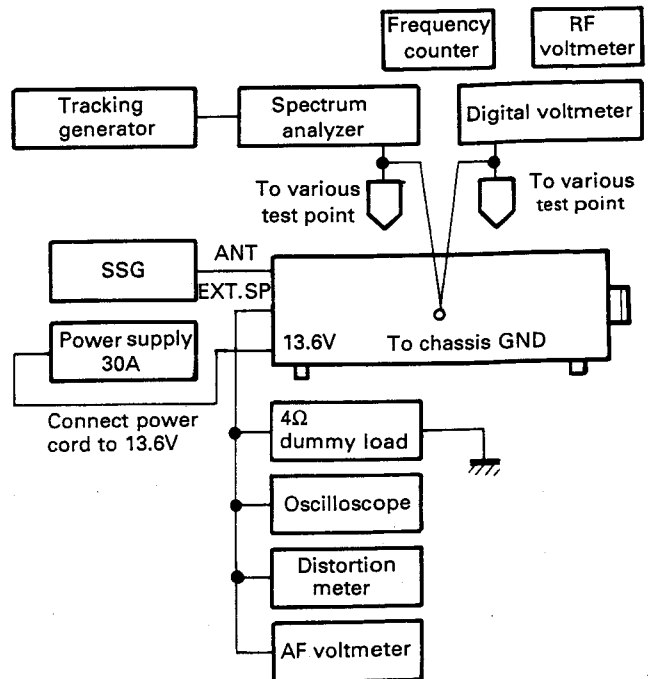
4. SSG specifications:

Frequency	2.101.0 MHz
Level	RF OUT OFF

Check that the voltage at the TP3 terminal of the TX-RX unit increases approximately 5.45 V.

### 7. Squelch Adjustment

1. Set that the receiving frequency is free and that the mode is USB.
2. Turn VR5 of the TX-RX unit counterclockwise as far as it will go. (Preset)
3. Set the SQL switch on the front panel to ON, then slowly turn VR5 until it is set to the threshold position.

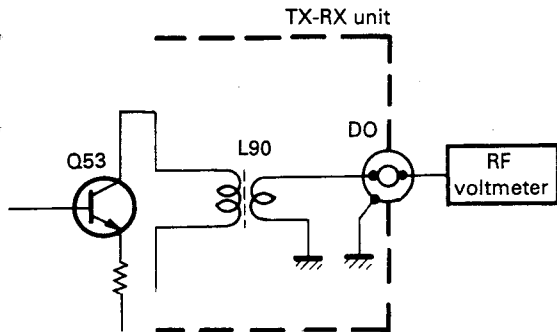


## ADJUSTMENT

### Transmitter Adjustment

#### 1. Setting

1. Remove the coaxial plug (DO) of the TX-RX unit from the printed circuit board, then connect a RF voltmeter to the coaxial plug.



2. Set VR10 of the TX-RX unit to the center position.
3. Set that the memorizing frequency is 2.100.0 MHz, the mode is CW.
4. Insert a MIC or STBY switch into the microphone connector, then place the set in the transmit mode.
5. Turn L79, L80, and L84 of the TX-RX unit until the RF voltmeter (50Ω terminated) reading is maximum. (Specification: 0.5 Vrms or more.)

#### 2. Carrier Level Adjustment

1. Connect an RF voltmeter to the DO terminal of the TX-RX unit as described in step 1, then place the set in the transmit mode.
2. Turn VR10 of the TX-RX unit until the RF voltmeter reading is 8 dBm. (Specification:  $8 \pm 0.5$  dBm)
3. Return the set to the receive mode.

**Note:** After adjustment is completed, remove the coaxial plug (DO) of the TX-RX unit from the RF voltmeter, then insert the coaxial plug into the coaxial socket on the printed circuit board.

#### 3. Transmission Output Adjustment

1. Set the POWER switch to OFF.
2. Change DIP switch S301's No.1 of the control unit from ON to OFF.
3. Check DIP switch S301's No. 3 and No.4 to ON.
4. Set the POWER switch to ON.
5. Connect a power meter to the ANT terminal.
6. Set that the memorizing frequency is 2.100.0 MHz and that the mode is CW.

#### 3-1. High Power Adjustment

1. Place the set in the transmit mode.
2. Turn VR14 of the TX-RX unit until the power is 110 W. (Specification:  $110 \pm 5$  W)
3. After adjustment is completed, return the set to the receive mode.

#### 3-2. MED Power Adjustment

1. Set the POWER switch to OFF.
2. Change DIP switch S301's No.1 of the control unit from ON to OFF.
3. Change DIP switch S301's No. 3 to ON and No.4 to OFF.
4. Set the POWER switch to ON.
5. Place the set in the transmit mode.
6. Turn VR17 of the TX-RX unit until the power is 60 W. (Specification:  $60 \pm 5$  W)
7. After adjustment is completed, return the set to the receive mode.

#### 3-3. Low Power Adjustment

1. Set the POWER switch to OFF.
2. Change DIP switch S301's No.1 of the control unit from ON to OFF.
3. Change DIP switch S301's No. 3 and No.4 to OFF.
4. Set the POWER switch to ON.
5. Place the set in the transmit mode.
6. Turn VR18 of the TX-RX unit until the power is 30 W. (Specification:  $30 \pm 3$  W)
7. After adjustment is completed, return the set to the receive mode.
8. Change DISP switch S301's No. 2 through No.4 to ON.

#### 4. MIC Sensitivity Adjustment

1. Connect a power meter to the ANT terminal.
2. Connect an AG to the microphone connector, then connect an AF voltmeter to check the AG output.  
AG specifications:  
Frequency 1 kHz  
Level 5 mV
3. Set that the memorizing frequency is 2.100.0 MHz and that the mode is USB.
4. Place the set in the transmit mode.
5. Turn VR9 of the TX-RX unit until the power is 50 W. (Specification:  $50 \pm 5$  W)
6. Return the set to the receive mode.

## ADJUSTMENT

### 5. Transmitting Meter Adjustment

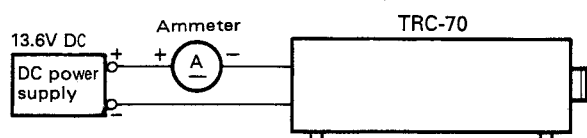
1. Make the adjustments outlined in steps 4-1 through 4-4 above. Except AG frequency : 1 kHz, level : 50 mV.
2. Place the set in the transmit mode.
3. Turn VR20 of the TX-RX unit until the LCD transmitting meter reads that a "8-point bar indicator" goes on.
4. Return the set to the receive mode.

### 6. H3E Carrier Level Adjustment

1. Connect a power meter to the ANT terminal.
3. Set that the memorizing frequency is 2.100.0 MHz and that the mode is H3E.
3. Place the set in the transmit mode.
4. Turn VR11 of the TX-RX unit until the power is 45 W. (Specification:  $45W \pm 5 W$ )

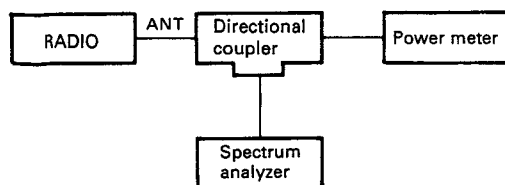
### 7. Protection Adjustment

1. Connect a DC ammeter (30 A range) in series to the (+) DC line.
2. Strap the ANT terminal with a check jig.
3. Set that the memorizing frequency is 4.100.0 MHz and that the mode is CW.
4. Place the set in the transmit mode.
5. Turn VR15 of the TX-RX unit until the ammeter reading is 16 A. (Specification:  $16 \pm 0.5 A$ )
6. After adjustment is completed, return the set to the receive mode.



### 8. Carrier Suppression Adjustment

1. Connect a power meter to the ANT terminal via a directional coupler.
2. Connect a spectrum analyzer to one side of the directional coupler.
3. Set that the memorizing frequency is 2.100.0 MHz and that the mode is USB.
4. Place the set in the transmit mode.
5. Turn VR12 and VR13 of the TX-RX unit until the spectrum analyzer reading is minimum. Specification: 60 dB-lower than full power in the CW mode
6. Return the set to the receive mode.



### 9. Transmitting Frequency Characteristic Adjustment

1. Connect a power meter to the ANT terminal via a directional coupler.
2. Connect an oscilloscope to one side of the directional coupler.
3. Connect the two audio generators to Microphone connector. Also, connect an AF voltmeter to check the AG output.

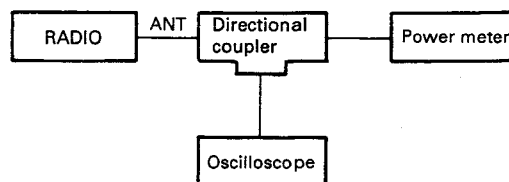
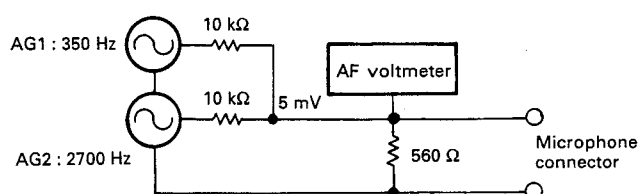
AG specifications:

AG1 frequency	350 Hz
Output	5 mV
AG2 frequency	2700 Hz
Output	5 mV

4. Set that the memorizing frequency is 2.100.0 MHz and that the mode is USB.
5. Place the set in the transmit mode.
6. Turn VR301 of the control unit until the waveform is crossed.



7. Press the MOD key to enter the LSB mode.
8. Place the set in the transmit mode.
9. Turn VR302 of the control unit until the waveform is crossed.
10. Return the set to the receive mode.



## ADJUSTMENT

### 10. 1500 Hz Tone Adjustment

1. Remove the coaxial plug (DO) of the TX-RX unit from the printed circuit board, then connect an RF voltmeter to the coaxial plug.
2. Set that the memorizing frequency is 2.100.0 MHz and that the mode is USB.
3. Press the TONE key to place the set in the transmit mode.
4. Turn VR8 of the TX-RX unit until the RF voltmeter reading is 8 dBm. (Specification:  $8 \pm 0.5$  dBm)
5. After adjustment is completed, return the set to the receive mode.

**Note:** After adjustment is completed, remove the coaxial plug (DO) of the TX-RX unit from the RF voltmeter, then insert the coaxial plug into the coaxial socket on the printed circuit board.

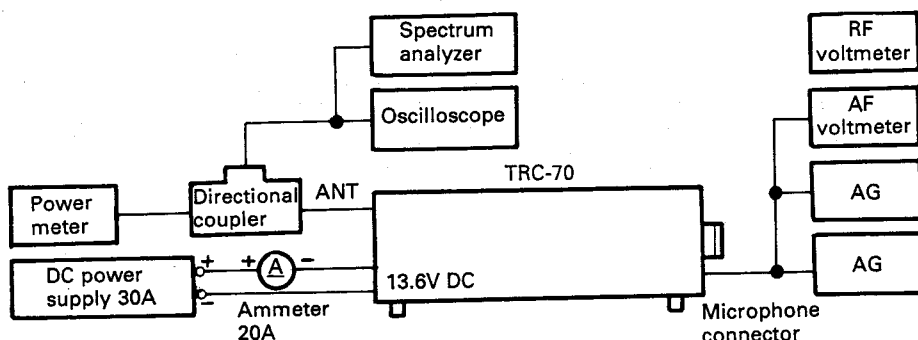
### 11. Semi-break-in Adjustment

1. Connect a power meter to the ANT terminal via a directional coupler.
2. Connect an oscilloscope to one side of the directional coupler.
3. Insert the key to the key jack of the rear panel.
4. Set that the memorizing frequency is 2.100.0 MHz

5. Place the key is goes down.
6. Check the set in the transmit mode, and waveform is normally.
7. Check that the delay time is changed when VR22 of the TX-RX unit is turned.
8. Set the VR22 to mechanical center point after checked.

### 12. Tuning Power Adjustment

1. Connect a power meter to the ANT terminal.
2. Connect the control cable of the antenna coupler MAT-100 (rear panel).
3. Set that the memorizing frequency is 2.100.0 MHz and that the mode is USB.
4. Press the TONE key to place the set in the transmit mode.
5. Turn VR19 of the TX-RX unit until the power is 10 W. (Specification:  $10 \pm 1$  W)
6. Return to receive mode automatically after transmitting 15 seconds.



### 13. After adjustment is completed, perform the following:

#### • Erase the memorized frequencies and modes

- Only the transmitting/receiving frequencies below those memorized for adjustment must be erased.

0.100.0 MHz	USB	4.100.0 MHz	CW
2.099.0 MHz	CW	7.000.0 MHz	USB
2.100.0 MHz	USB	14.000.0 MHz	USB
2.100.0 MHz	CW	22.000.0 MHz	USB
2.100.0 MHz	H3E		

1. Press the ENT key to select the memory entry mode.
2. Turn the encoder and set it to the memory channel to be erased.
3. Press the O key.
4. Press the ENT key.

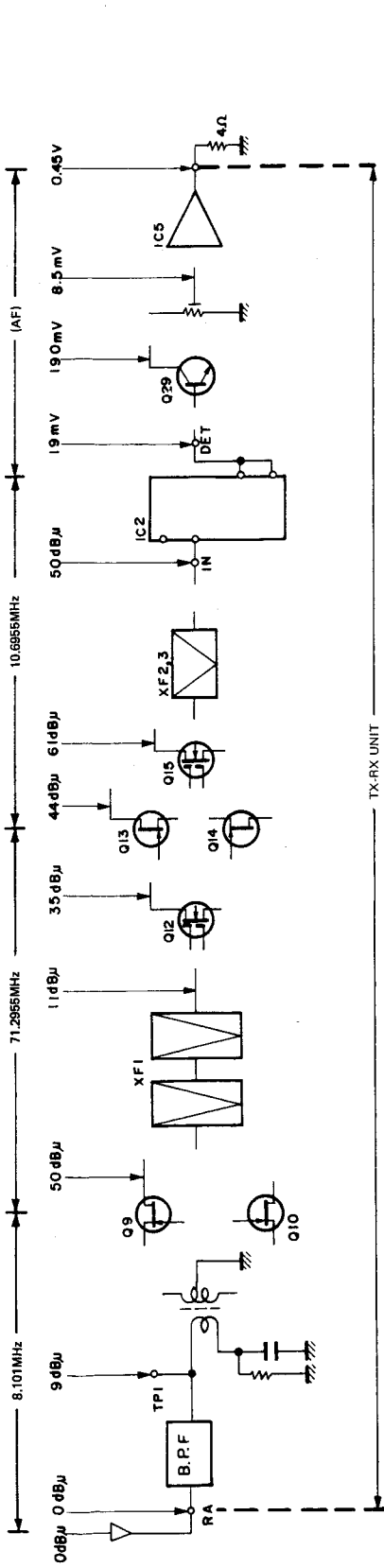
The frequencies and modes of the memory channel that was used for adjustment are then erased.

**Note:** Return the DIP switch S301 to original position (before factory setup position).

S301 No.1 through No. 4 : ON

LEVEL DIAGRAM

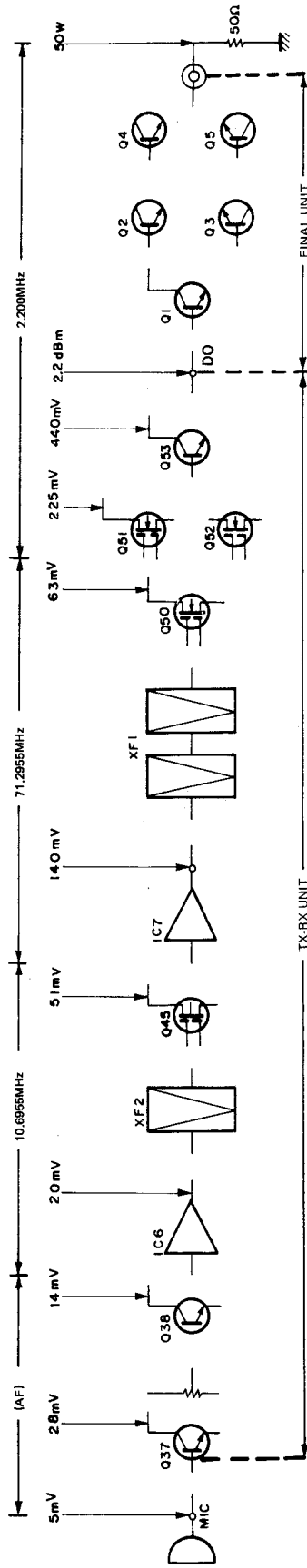
Receiver section



Freq. : 8.100MHz  
Mode : J3E USB  
SSG output : 0dBμ  
AF output : 0.45V/8Ω

1. These SSG signal level values are necessary in order to obtain the same level of audio output (with the AF VR fixed) when 0.45V/8Ω audio signals are obtained (using the AF GAIN VR) from 8.100MHz, 0dBμ, signal input from antenna.
2. SSG output was measured, using a 0.01μF capacitor for RF and IF circuit.
3. SSG output was measured, using a 10μF electro capacitor for AF circuit.

Transmitter section

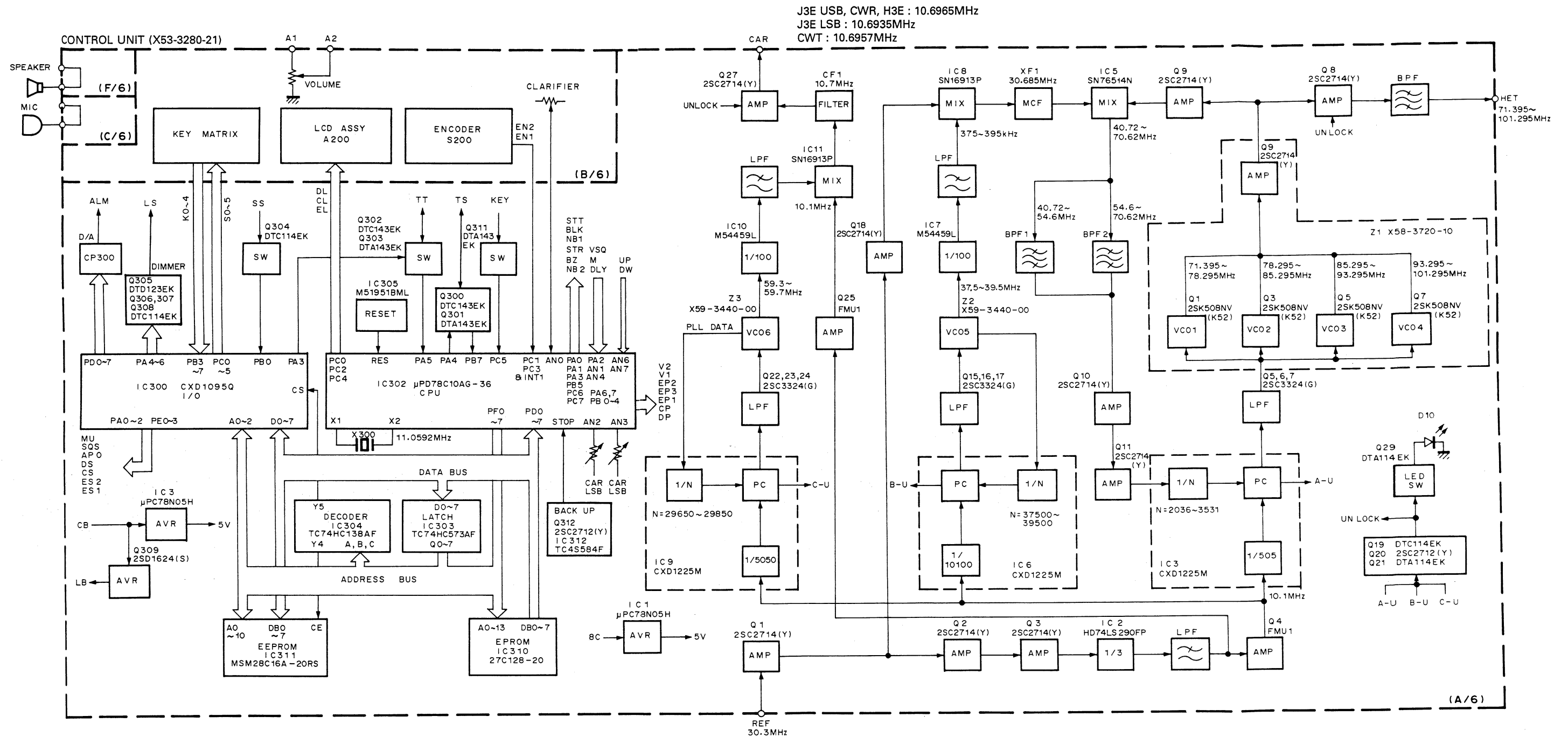


1. Freq. : 2.200MHz
2. Mode : J3E USB
3. The high frequency circuits measured with a power meter in USB mode. (50Ω terminated to DO terminal on the TX-RX unit)
4. The audio input voltages are necessary to that output almost reaches saturation (AG : 1kHz, 5mV single tone).



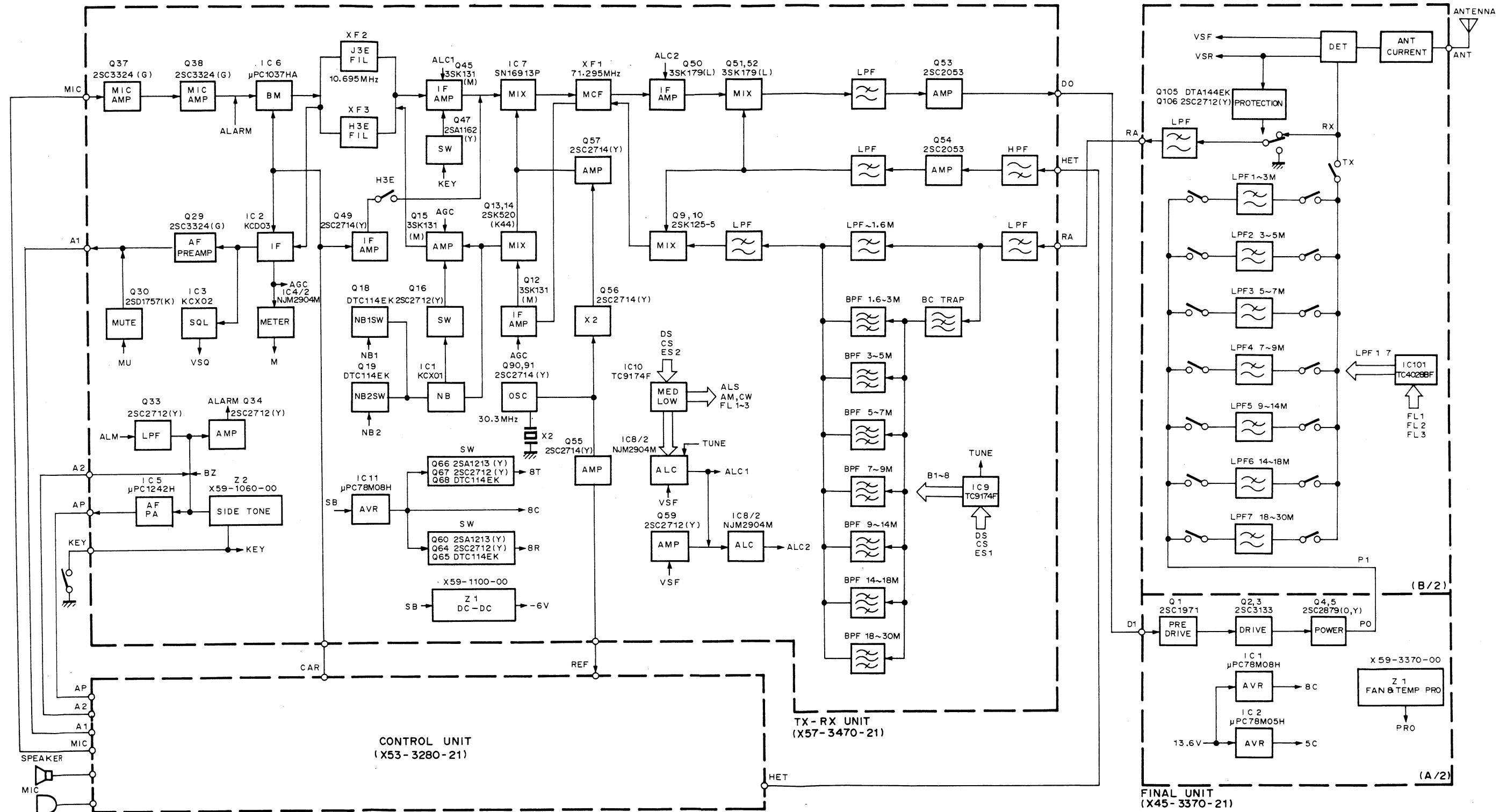
# TRC-70 TRC-70

## BLOCK DIAGRAM



# TRC-70 TRC-70

## BLOCK DIAGRAM



TRC-70

TERMINAL FUNCTION

Connector	Terminal		Terminal function
No.	No.	Name	
FINAL UNIT (X45-3370-21) (A/2)			
CN1	1	PS1	Power switch 1.
	2	PS2	Power switch 2.
	3	NC	Not used.
CN2	1	M+	Fan motor control signal
	2	M-	Fan motor control signal.
CN3	1	CB	Common +B.
	2	8C	Common +8V.
	3	SB	Switched +B (+13.6V).
	4	NC	Not used.
	5	8T	TX +8V.
	6	8R	RX +8V.
	7	PRO	Protection.
	8	E	GND
CN4	1	E	GND
	2	5C	Common +5V.
	3	8T	TX +8V.
	4	8R	RX +8V.
CN5		PO	RF power output.
W2		DI	Drive input.
W3	1	FSB	Final switched +B.
	2	FSB	Final switched +B.
	3	SB	Switched +B (+13.6V).
	4	SB	Switched +B (+13.6V).
	5	E	GND
	6	E	GND
W6		B	+B (+13.6V).
		B	+B (+13.6V).
		E	GND
		E	GND
FINAL UNIT (X45-3370-21) (B/2)			
CN101		RA	Receive antenna.
CN102	1	E	GND
	2	5C	Common +5V.
	3	8T	TX +8V.
	4	8R	RX +8V.
CN103	1	AC1	Antenna current protection.
	2	VSF	VSWR (Forward).
	3	E	GND
	4	VSR	VSWR (Reflection).
	5	FL3	Final band information 3.
	6	FL2	Final band information 2.
	7	FL1	Final band information 1.
W101		PI	RF power input.
		ANT	Antenna.
		E	GND
CONTROL UNIT (X53-3280-21) (A/6)			
CN1		REF	30.6MHz.
CN2		HET	1st local.
CN3		CAR	Carrier.
CN300	1	E	GND
	2	8C	Common +8V.
	3	DLY	Delay volume.
	4	TT	Antenna tuner signal.
	5	STR	Receive STBY.
	6	TS	Antenna tuner signal
	7	STT	Transmit STBY.
	8	BLK	Blanking signal.

Connector	Terminal		Terminal function
	No.	Name	
	9	VSQ	Voice SQL output.
	10	NB1	Noise blanker 1 switch.
	11	BZ	Buzzer signal.
	12	NB2	Noise blanker 2 switch.
	13	ALM	Alarm signal.
	14	KEY	Key.
	15	MU	Audio mute.
	16	SQS	Squelch switching.
	17	M	Meter.
	18	DS	Serial-parallel converter IC data.
	19	CS	Serial-parallel converter IC clock.
	20	ES2	Serial-parallel converter IC enable 2.
	21	ES1	Serial-parallel converter IC enable 1.
	22	NC	Not used.
	23	SS	STBY switch.
	24	APO	Audio power output control.
	25	CB	Common +B.
CN301	1	NC	Not used.
	2	NC	Not used.
	3	UP	MIC up.
	4	DW	MIC down.
	5	K0	Key scan input.
	6	K1	Key scan input.
	7	K2	Key scan input.
	8	K3	Key scan input.
	9	K4	Key scan input.
	10	E	GND
	11	S0	Key scan output.
	12	S1	Key scan output.
	13	S2	Key scan output.
	14	S3	Key scan output.
	15	S4	Key scan output.
	16	S5	Key scan output.
	17	5V	+5V.
	18	EN1	Encoder clock 1.
	19	LS	Dimmer switch for LCD illumination.
	20	EN2	Encoder clock 2.
	21	EL	LCD enable.
	22	CL3	Clarifier volume.
	23	CL	LCD clock.
	24	CL2	Clarifier volume.
	25	DL	LCD data.
	26	CL1	Clarifier volume.
	27	LB	+B for LCD illumination.
CONTROL UNIT (X53-3280-21) (B/6)			
CN200	1	NC	Not used.
	2	NC	Not used.
	3	UP	MIC up.
	4	DW	MIC down.
	5	K0	Key scan input.
	6	K1	Key scan input.
	7	K2	Key scan input.
	8	K3	Key scan input.
	9	K4	Key scan input.
	10	E	GND
	11	S0	Key scan output.
	12	S1	Key scan output.
	13	S2	Key scan output.
	14	S3	Key scan output.
	15	S4	Key scan output.
	16	S5	Key scan output.
	17	5V	+5V.

TRC-70

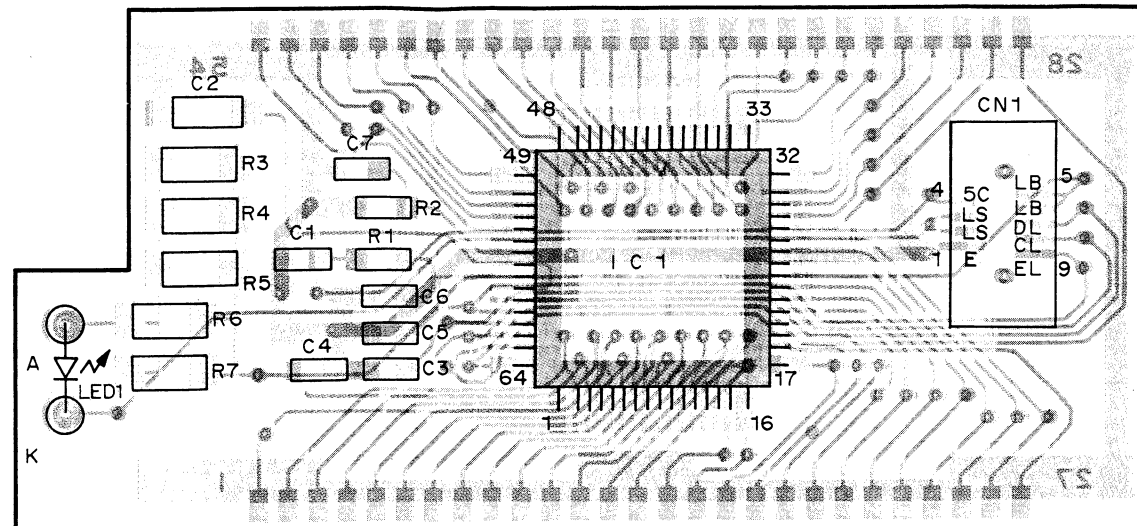
TRC-70

TERMINAL FUNCTION

Connector	Terminal		Terminal function
	No.	Name	
	18	EN1	Encoder clock 1.
	19	LS	Dimmer switch for LCD illumination.
	20	EN2	Encoder clock 2.
	21	EL	LCD enable.
	22	CL3	Clarifier volume.
	23	CL	LCD clock.
	24	CL2	Clarifier volume.
	25	DL	LCD data.
	26	CL1	Clarifier volume.
	27	LB	+B for LCD illumination.
CN202		5V	+5V.
		LS	Dimmer switch for LCD illumination.
		EL	LCD enable.
		CL	LCD clock.
		DL	LCD data.
W200	1	A1	AF VOL.
	2	A2	AF VOL.
	3	E	GND
W201	1	DW	MIC down.
	2	E	GND
	3	UP	MIC up.
CONTROL UNIT (X53-3280-21) (C/6)			
W201	1	DW	MIC down.
	2	E	GND
	3	UP	MIC up.
	4	8M	MIC connector +8V.
	5	SPS	Switched speaker.
	6	E	GND
	7	MIC	MIC
	8	SS	STBY switch.
CONTROL UNIT (X53-3280-21) (D/6)			
CN206	1	PS1	Power switch 1.
	2	PS2	Power switch 2.
CONTROL UNIT (X53-3280-21) (E/6)			
W202	1	NC	Not used.
	2	ESP	External speaker.
	3	SPS	Switched speaker.
CONTROL UNIT (X53-3280-21) (F/6)			
W202	1	AP	Audio power.
	2	E	GND
	3	ESP	External speaker output.
	4	ESP	External speaker output.
	5	SPS	Switched speaker.
	6	SPS	Switched speaker.
	7	E	GND
TX-RX UNIT (X57-3470-21) (A/2)			
CN1		RA	Receive antenna.
CN2		HET	1st local.
CN3		CAR	Carrier.
CN4		REF	30.6MHz.
CN5		DO	Drive output.
CN6	1	AC1	Antenna current protection.
	2	VSWR	VSWR (Forward).
	3	E	GND
	4	VSR	VSWR (Reflection).
	5	FL3	Final band information 3.

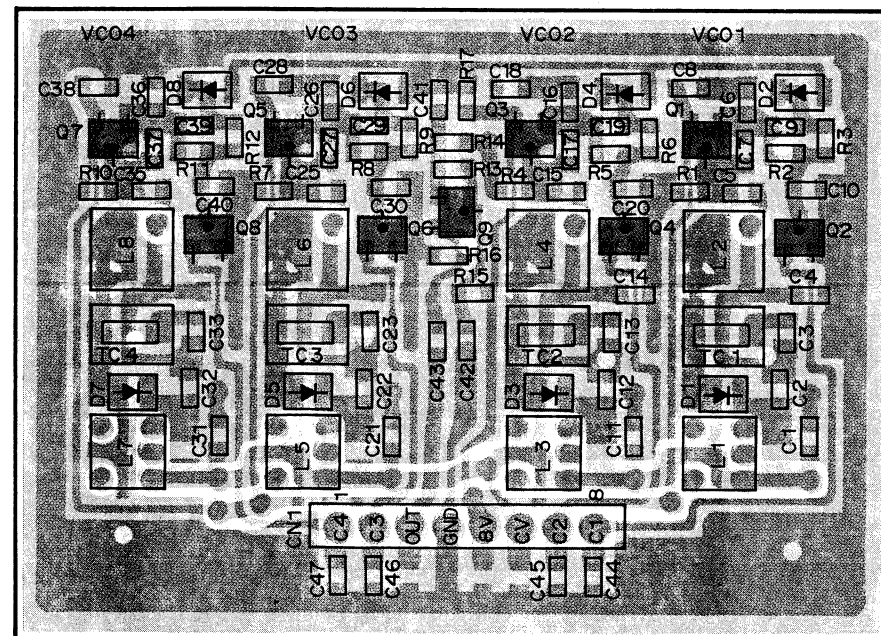
Connector	Terminal		Terminal function
	No.	Name	
	6	FL2	Final band information 2.
	7	FL1	Final band information 1.
CN7	1	CB	Common +B.
	2	8C	Common +8V.
	3	SB	Switched +B (+13.6V).
	4	NC	Not used.
	5	8T	TX +8V.
	6	8R	RX +8V.
	7	PRO	Protection.
	8	E	GND
CN8	1	8M	MIC connector +8V.
	2	SPS	Switched speaker.
	3	E	GND
	4	MIC	MIC
	5	SS	STBY switch.
CN9	1	ESP	External speaker.
	2	E	GND
	3	AP	Audio power.
CN10	1	E	GND
	2	8C	Common +8V.
	3	DLY	Delay volume.
	4	TT	Antenna tuner signal.
	5	STR	Receive STBY.
	6	TS	Antenna tuner signal
	7	STT	Transmit STBY.
	8	BLK	Blanking signal.
	9	VSQ	Voice SQL output.
	10	NB1	Noise blanker 1 switch.
	11	BZ	Buzzer signal.
	12	NB2	Noise blanker 2 switch.
	13	ALM	Alarm signal.
	14	KEY	Key.
	15	MU	Audio mute.
CN11	1	8M	MIC connector +8V.
	2	SPS	Switched speaker.
	3	E	GND
	4	MIC	MIC
	5	SS	STBY switch.
	6	APO	Audio power output control.
	7	CB	Common +B.
	8	VSQ	Voice SQL output.
	9	NB1	Noise blanker 1 switch.
	10	BZ	Buzzer signal.
	11	NB2	Noise blanker 2 switch.
	12	ALM	Alarm signal.
	13	KEY	Key.
	14	MU	Audio mute.
	15	SQS	Squelch switching.
CN12	1	8M	MIC connector +8V.
	2	SPS	Switched speaker.
	3	E	GND
	4	MIC	MIC
	5	SS	STBY switch.
	6	APO	Audio power output control.
	7	CB	Common +B.
	8	VSQ	Voice SQL output.
	9	NB1	Noise blanker 1 switch.
	10	BZ	Buzzer signal.
	11	NB2	Noise blanker 2 switch.
	12	ALM	Alarm signal.
	13	KEY	Key.
	14	MU	Audio mute.
	15	SQS	Squelch switching.
CN13	1	8M	MIC connector +8V.
	2	SPS	Switched speaker.
	3	E	GND
	4	MIC	MIC
	5	SS	STBY switch.
	6	APO	Audio power output control.
	7	CB	Common +B.
	8	VSQ	Voice SQL output.
	9	NB1	Noise blanker 1 switch.
	10	BZ	Buzzer signal.
	11	NB2	Noise blanker 2 switch.
	12	ALM	Alarm signal.
	13	KEY	Key.
	14	MU	Audio mute.
	15	SQS	Squelch switching.
TX-RX UNIT (X57-3470-21) (B/2)			
CN17	1	E	GND
	2	E	GND
	3	SB	Switched +B (+13.6V).
	4	SB	Switched +B (+13.6V).
	5	FSB	Final switched +B.
	6	FSB	Final switched +B.

LCD ASS'Y (B38-0324-05) Component side view



IC1 : LC7582A  
LED1 : BL116AY

VCO (X58-3720-10) Component side view



Q1, 3, 5, 7 : 2SK508NV(K52) Q2, 4, 6, 8 : DTC114EK Q9 : 2SC2714(Y)  
D1, 3, 5, 7 : 1SV166 D2, 4, 6, 8 : RLS135

2SA1162  
2SC2712  
2SC2714  
DTC114EK  
DTD123EK



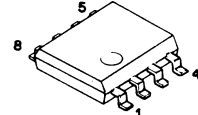
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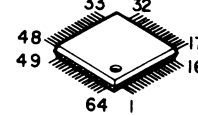
2SK210



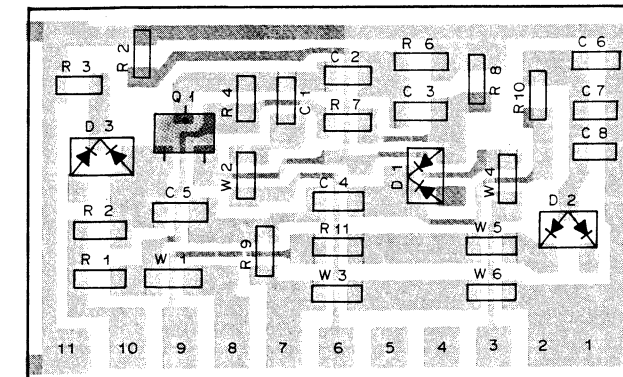
NJM2904M



LC7582A

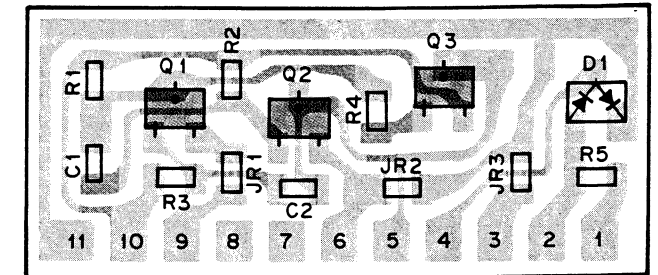


SIDE TONE (X59-1060-00)  
Component side view



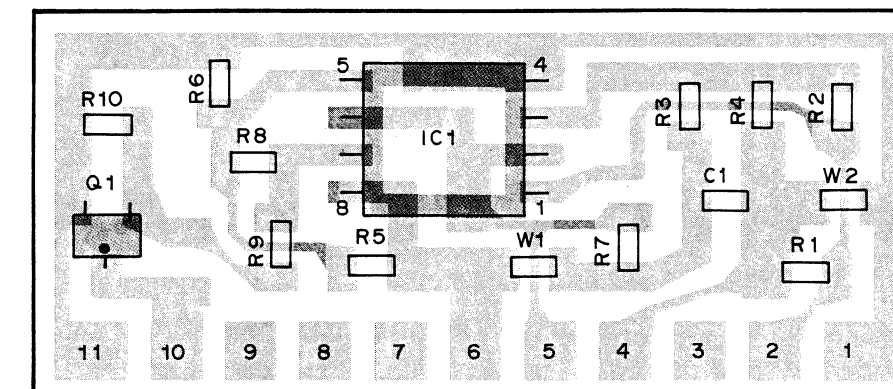
Q1 : 2SC2712(Y)  
D1, 3 : DAN202K D2 : DAP202K

DC-DC (X59-1100-00) Component side view



Q1,2 : 2SC2712(Y) Q3 : 2SA1162(Y)  
D1 : 1SS226

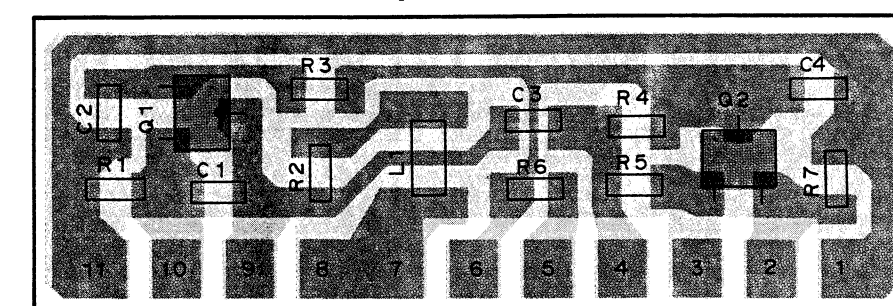
FAN & TEMP PROTECTION (X59-3370-00) Component side view



IC1 : NJM2904M  
Q1 : DTD123EK

R10 : Not used

VCO (X59-3440-00) Component side view

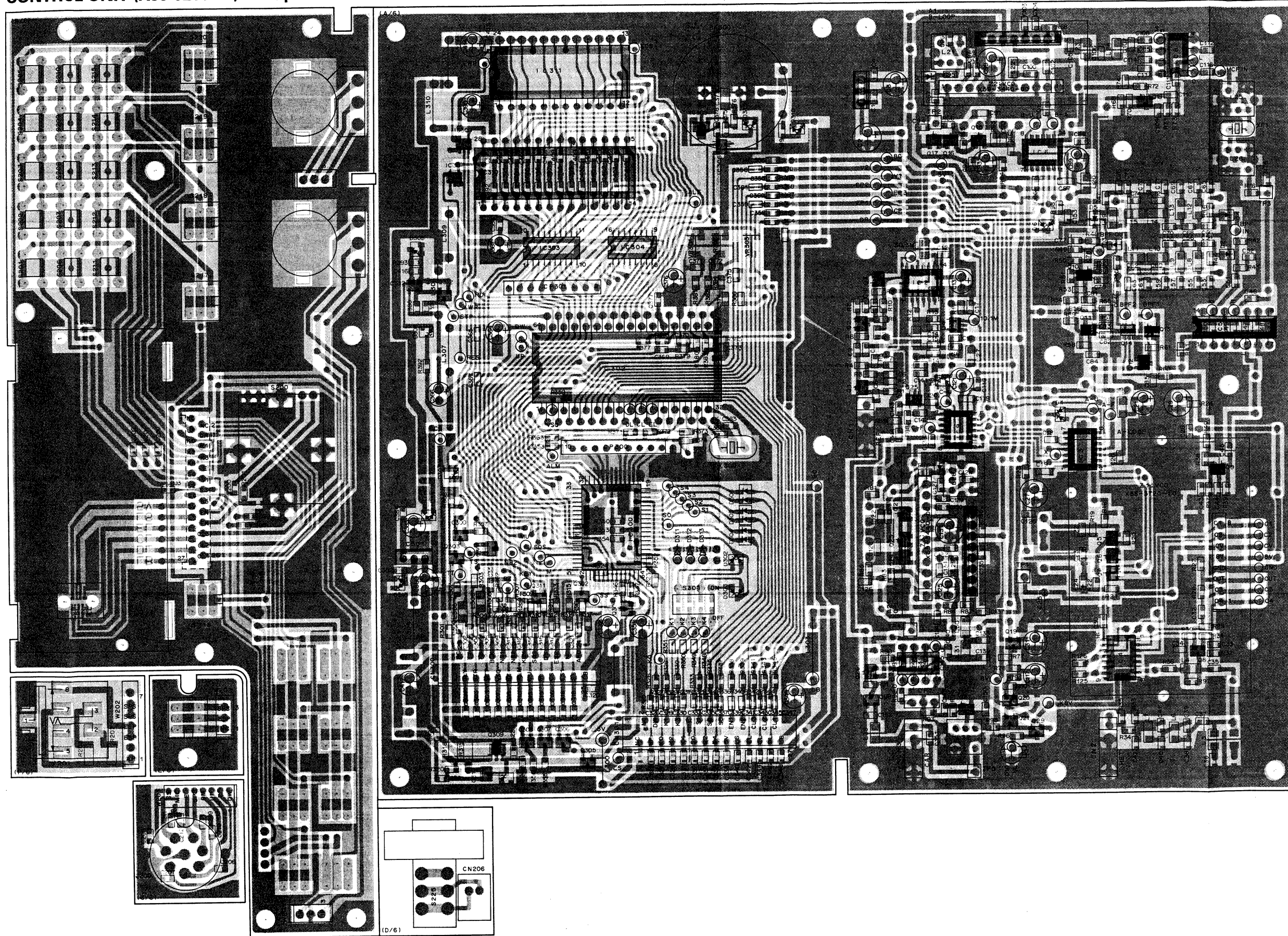


Q1 : 2SK210(GR) Q2 : 2SC2714(Y)

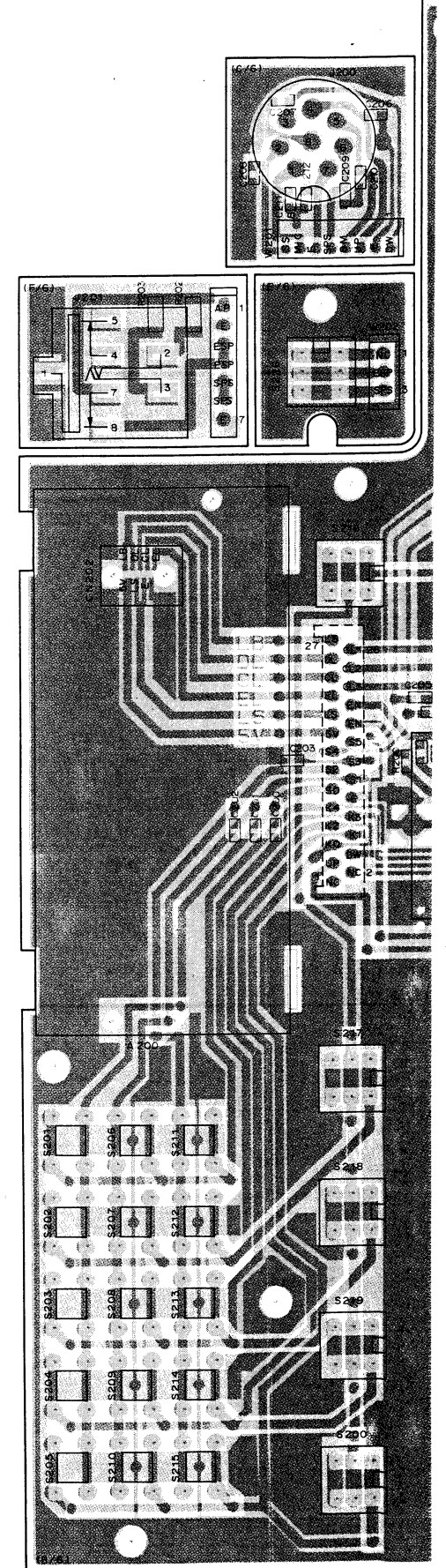


# TRC-70 PC BOARD VIEWS

CONTROL UNIT (X53-3280-21) Component side view

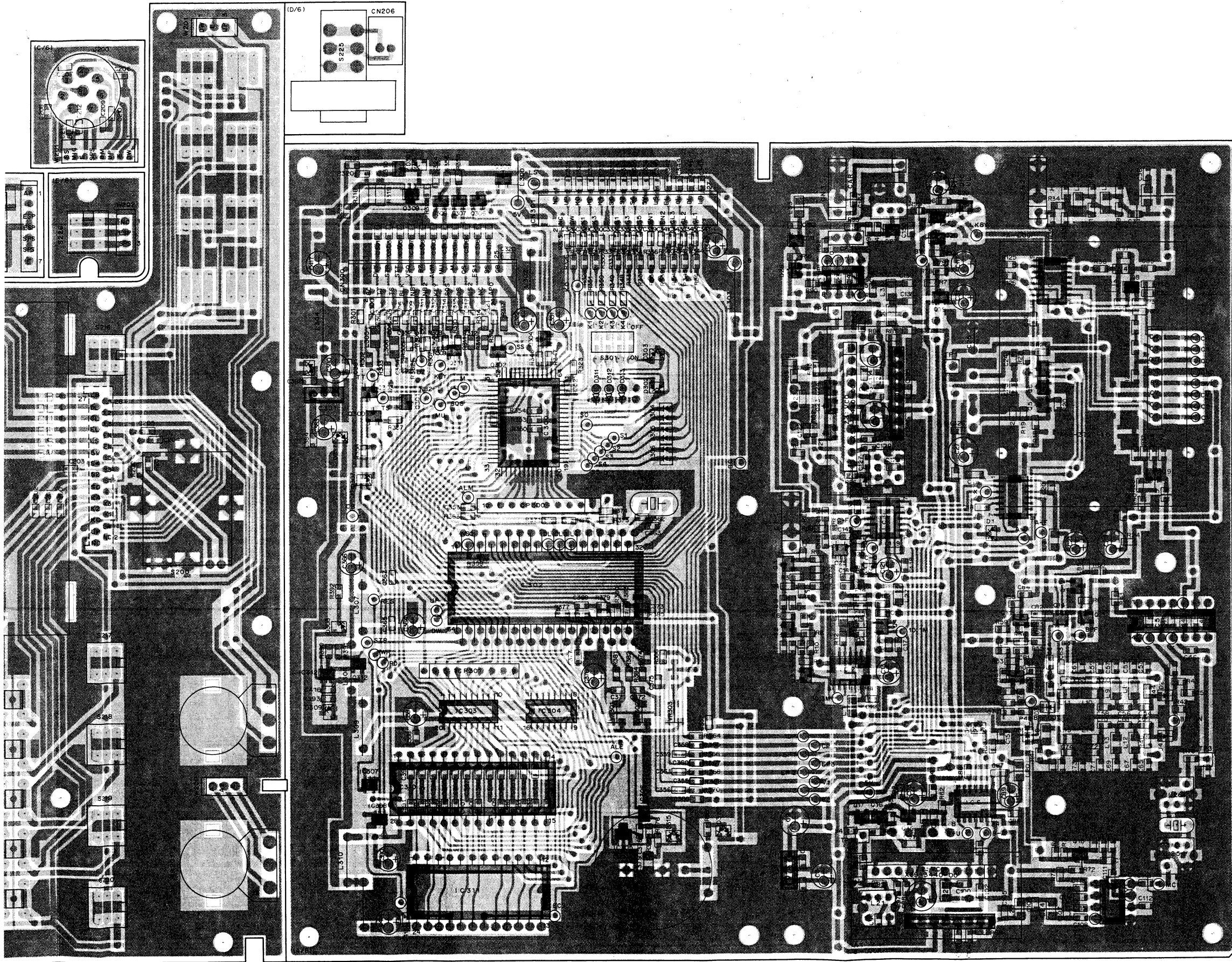


CONTROL UNIT (X53-3280-21) F





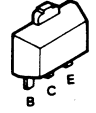
VIT (X53-3280-21) Foil side view



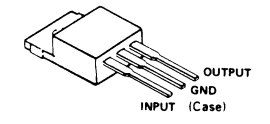
2SC2712  
2SC2714  
2SC3324  
DTA114EK  
DTA143EK  
DTC114EK  
DTC143EK  
DTD123EK



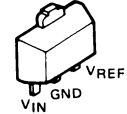
2SD1624S



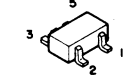
μPC78N05H



M51951BML



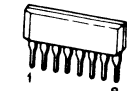
FMC2  
FMU1



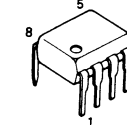
TC4S71F  
TC4S584F  
TC4SU69F



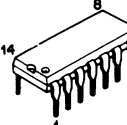
M54459L



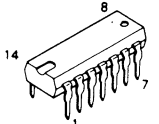
SN16913P



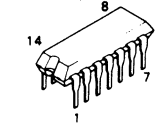
CXD1225M



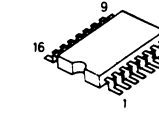
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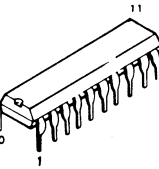
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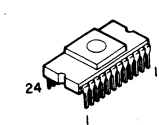
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TC4028BF



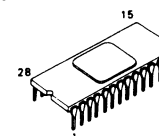
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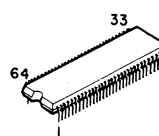
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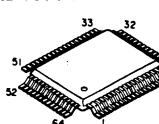
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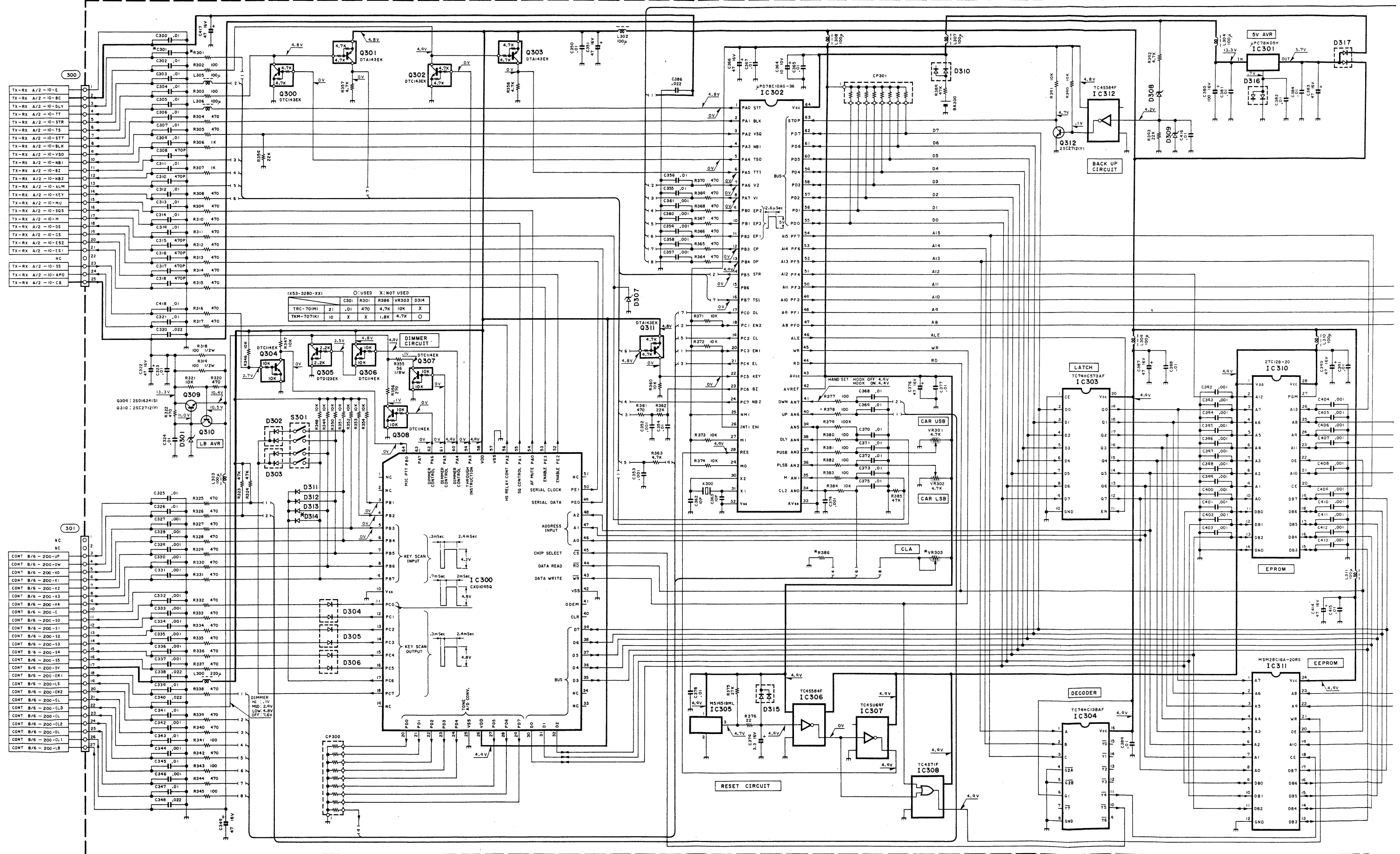
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CXD1095Q

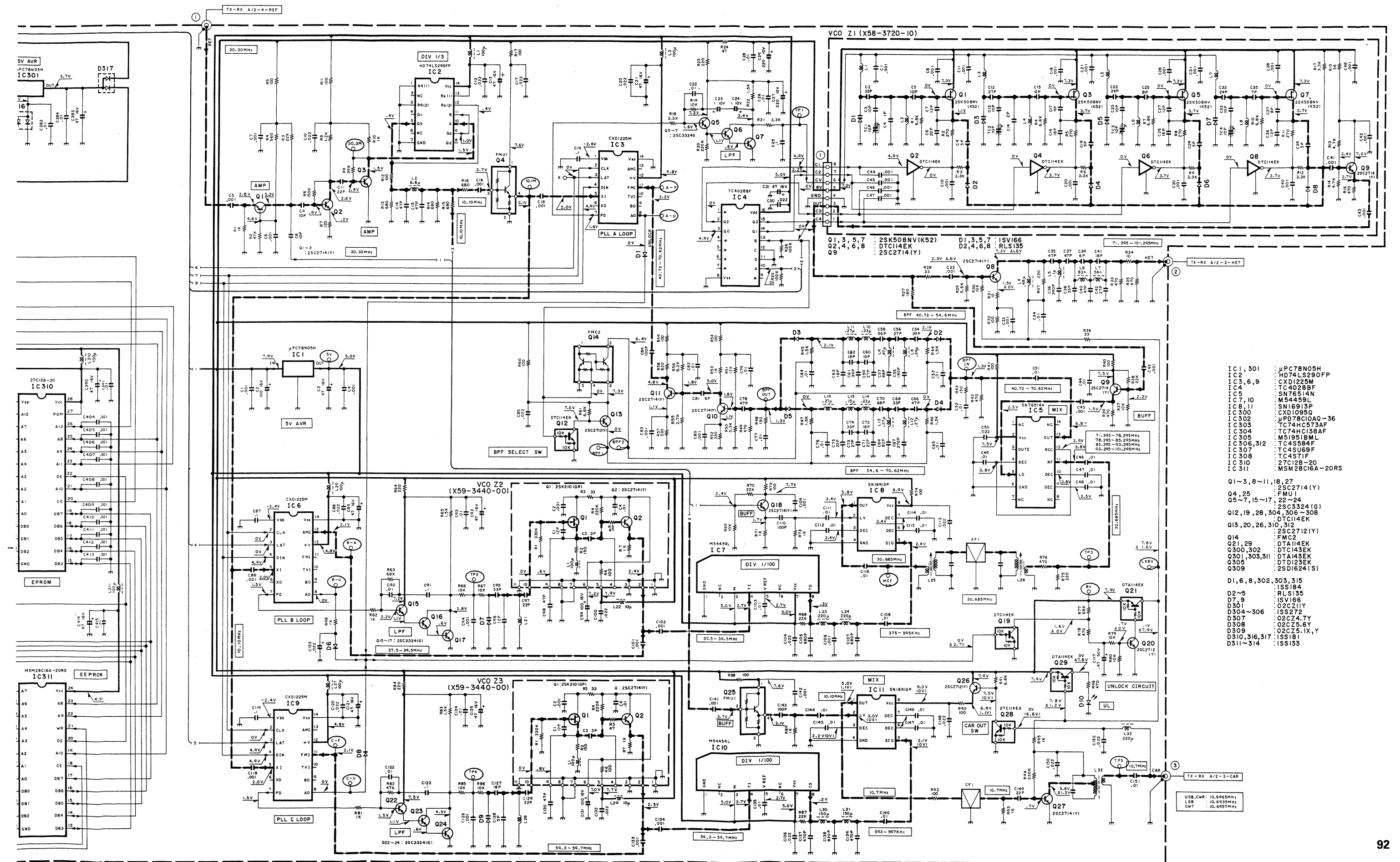


(X53-3280-21)(A/6) TRC-70(M)  
(X53-3280-10)(A/6) TKM-707(K)





# CIRCUIT DIAGRAM TRC-70





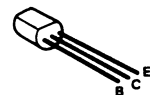
# TRC-70 PC BOARD VIEWS

TX-RX UNIT (X57-3470-21)- Component side view

2SA1162  
2SC2712  
2SC2714  
2SC3324  
2SD1757  
DTA114EK  
DTB143EK  
DTC114EK  
DTD143EK



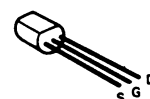
2SC2053



2SA1213  
2SC3649



2SK125-5



2SK520



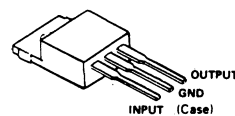
3SK131  
3SK179



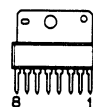
FMC3



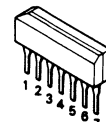
μPC78M08H



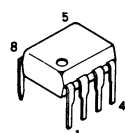
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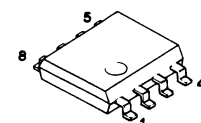
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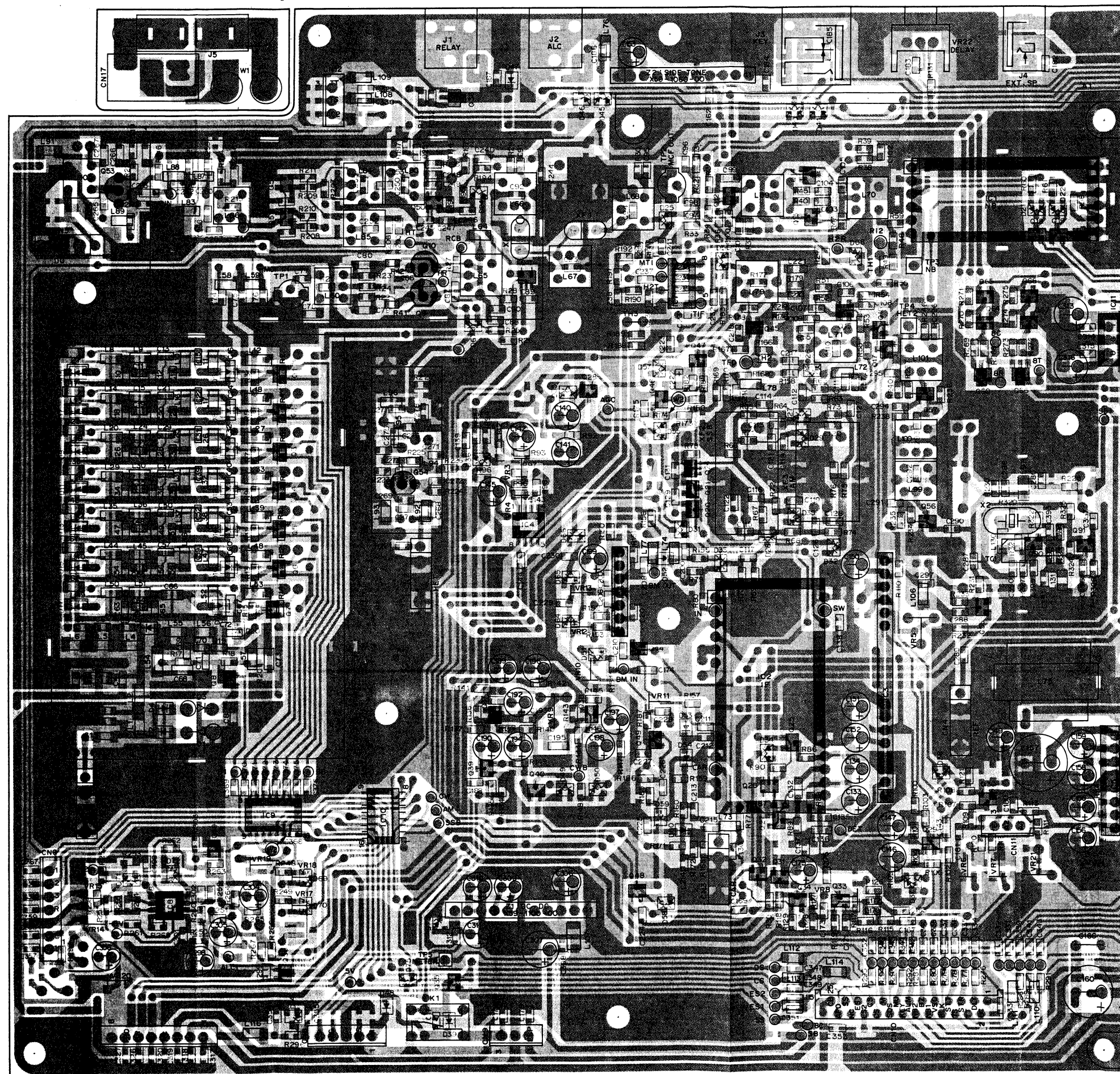
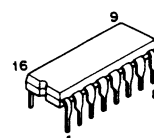
SN16913P



NJM2904M

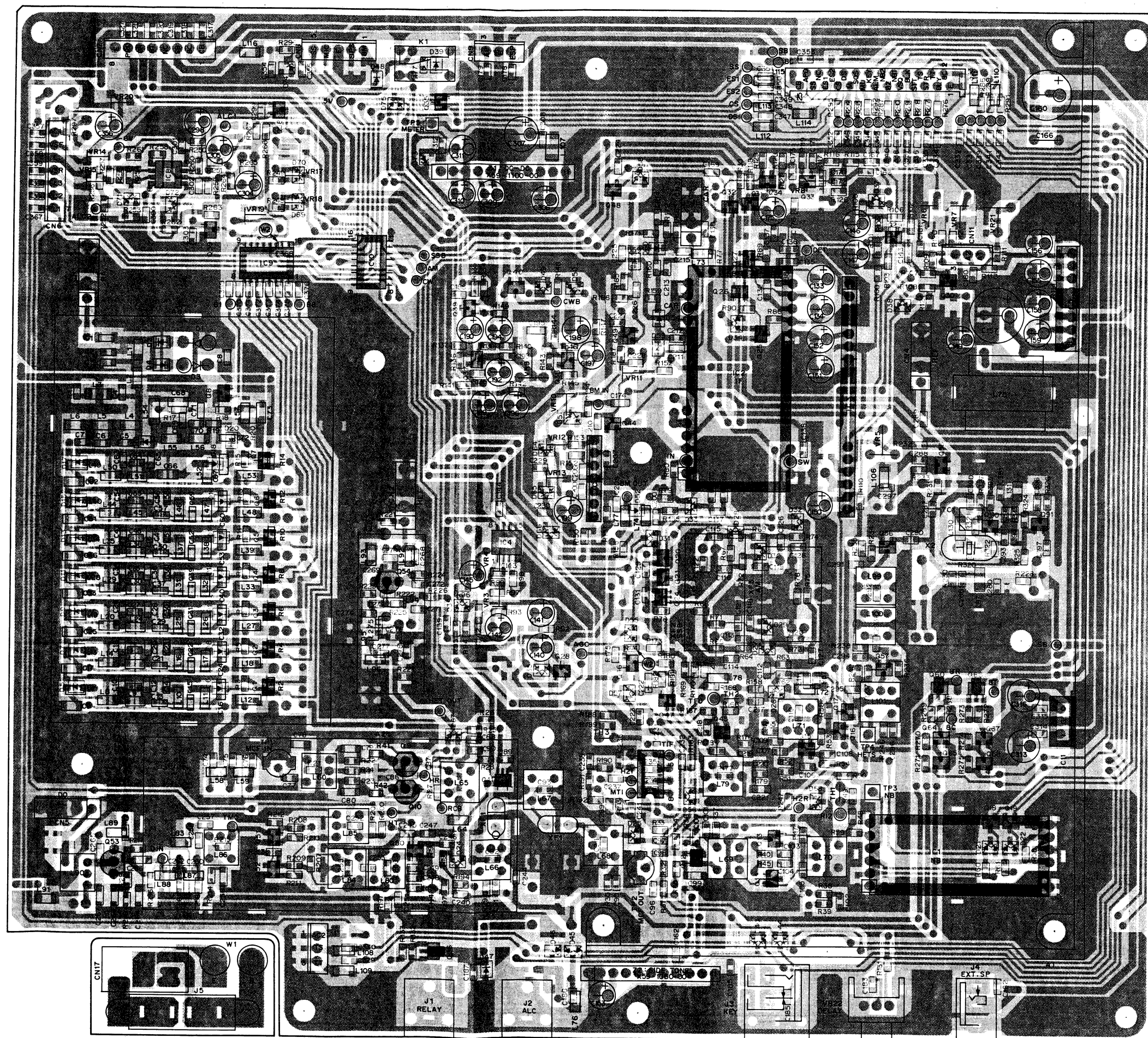
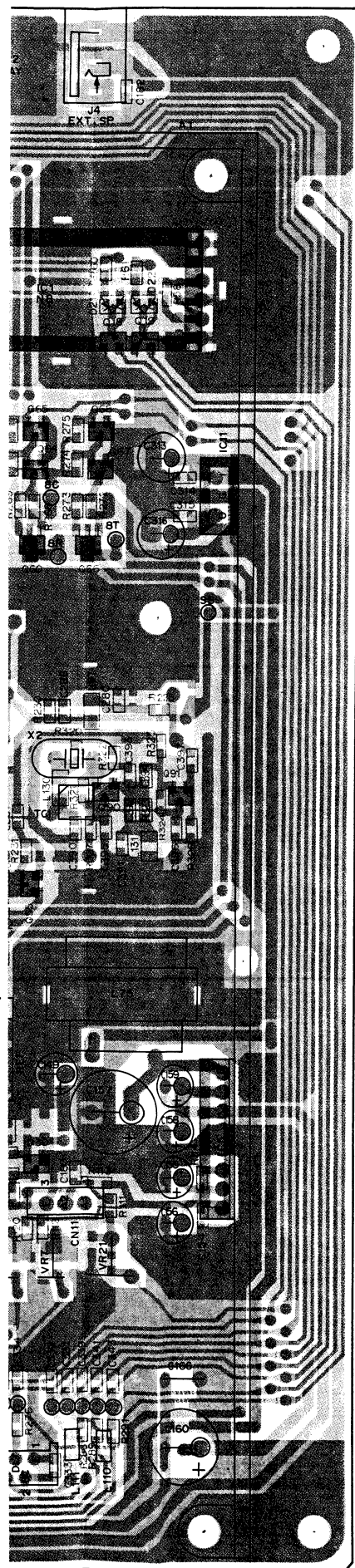


TC9174F



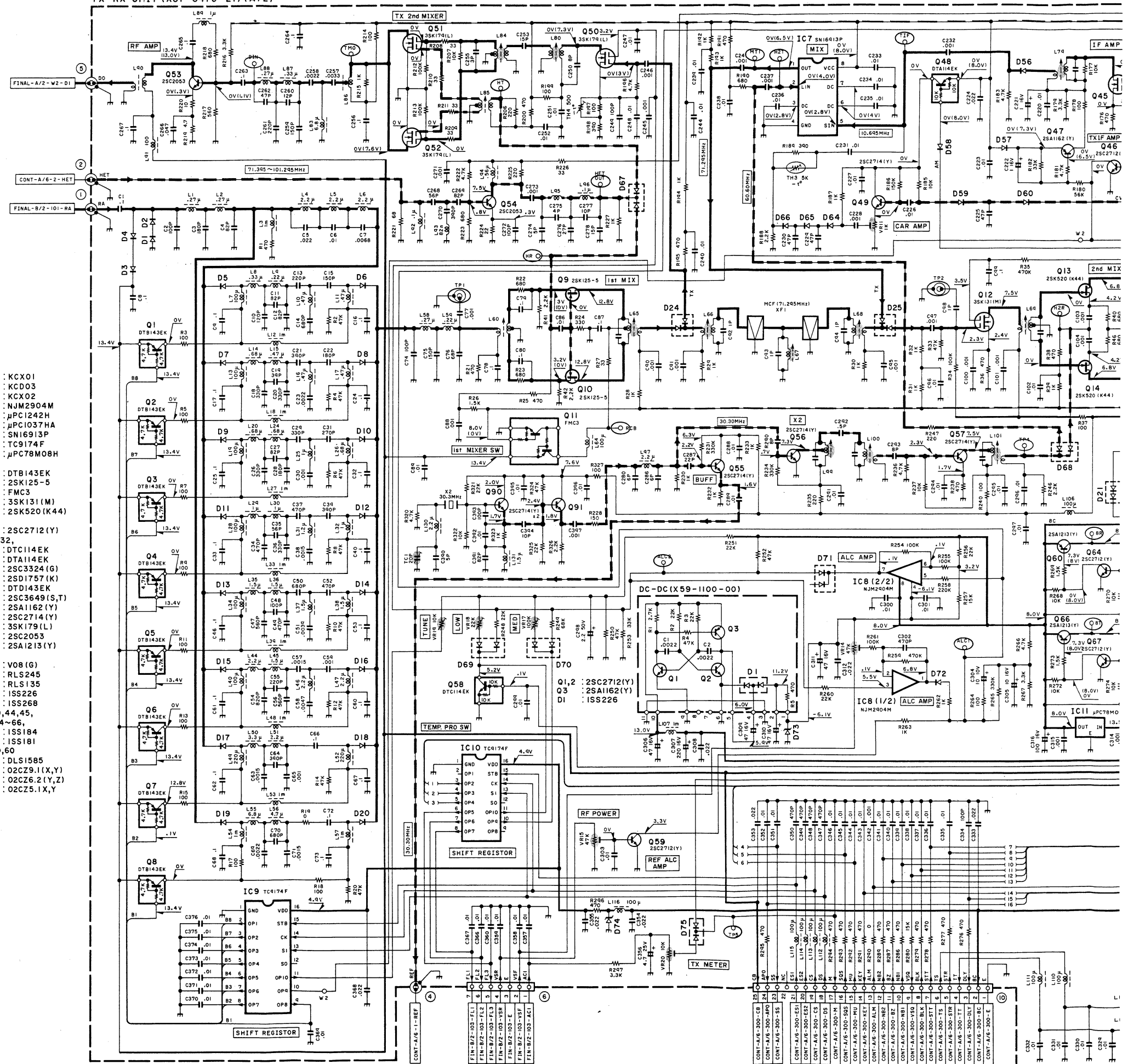


**TX-RX UNIT (X57-3470-21) Foil side view**

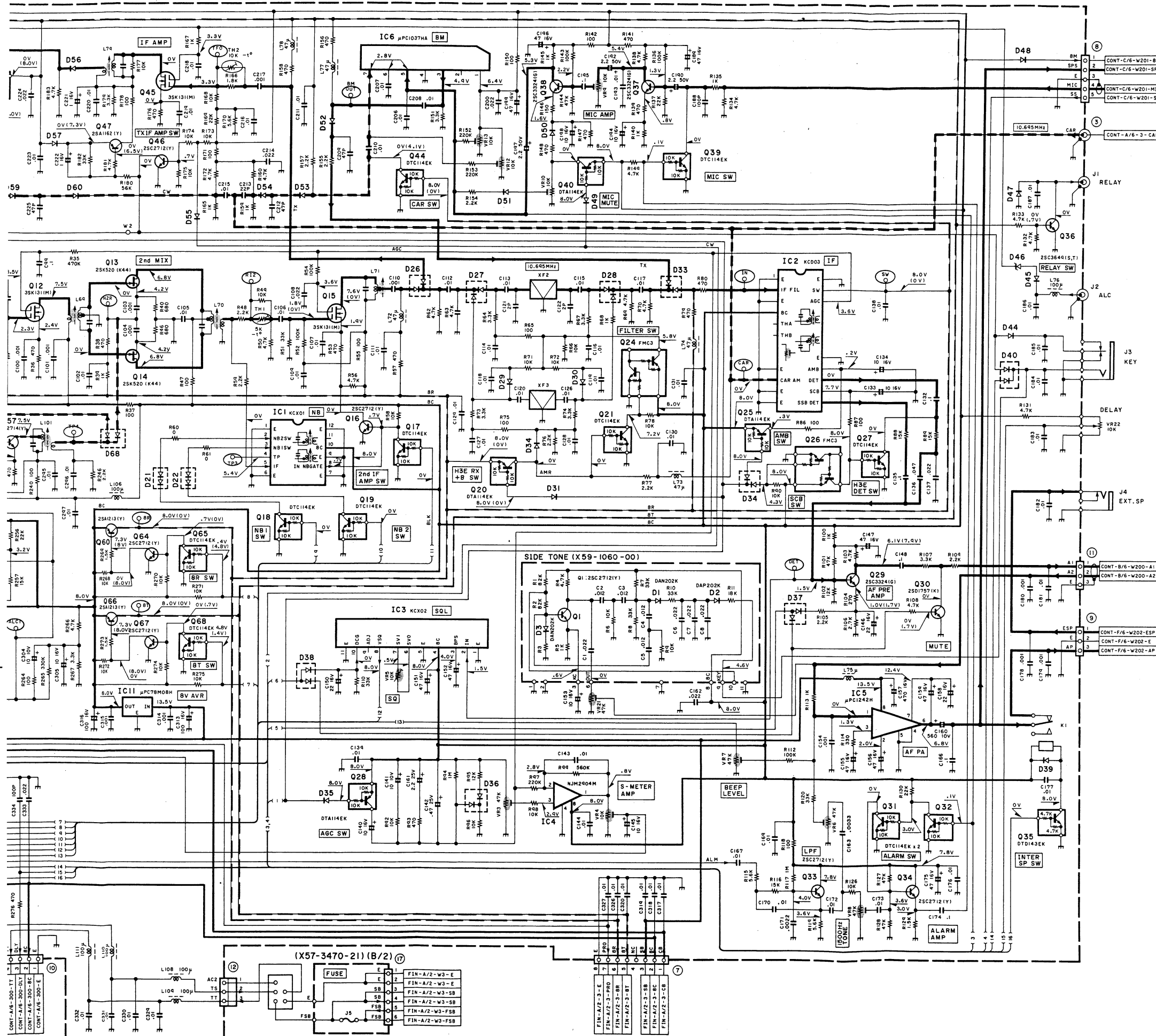




## TX-RX UNIT (X57-3470-21) (A/2)



# CIRCUIT DIAGRAM TRC-70

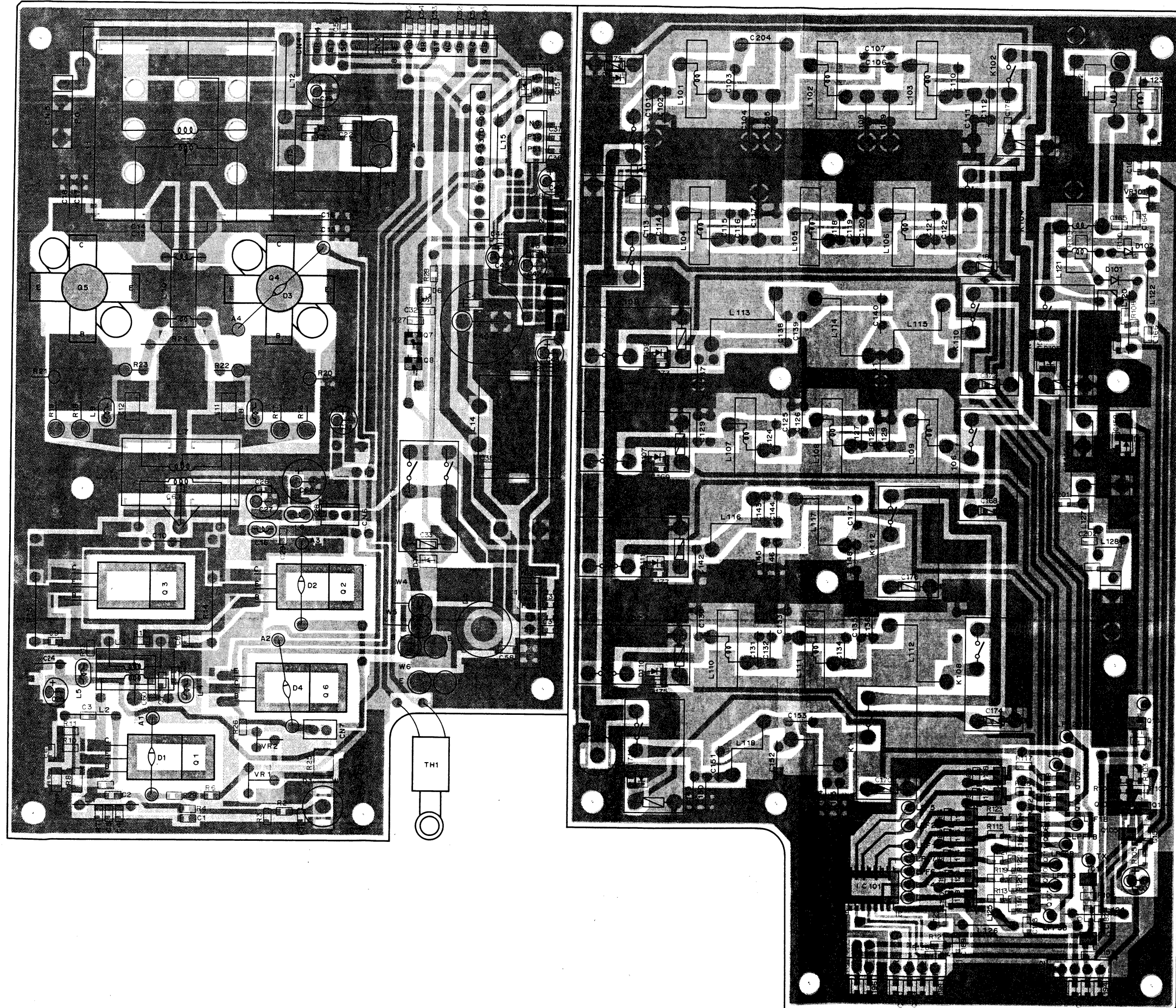








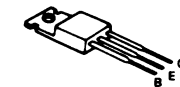
FINAL UNIT (X45-3370-21) Foil side view



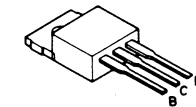
2SA1362  
2SC2712  
DTA114EK  
DTC124EK  
DTD114EK



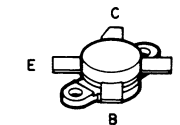
2SC1971  
2SC3133



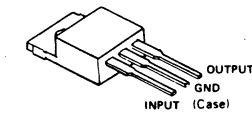
2SD1406



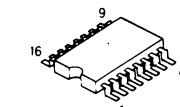
2SC2879



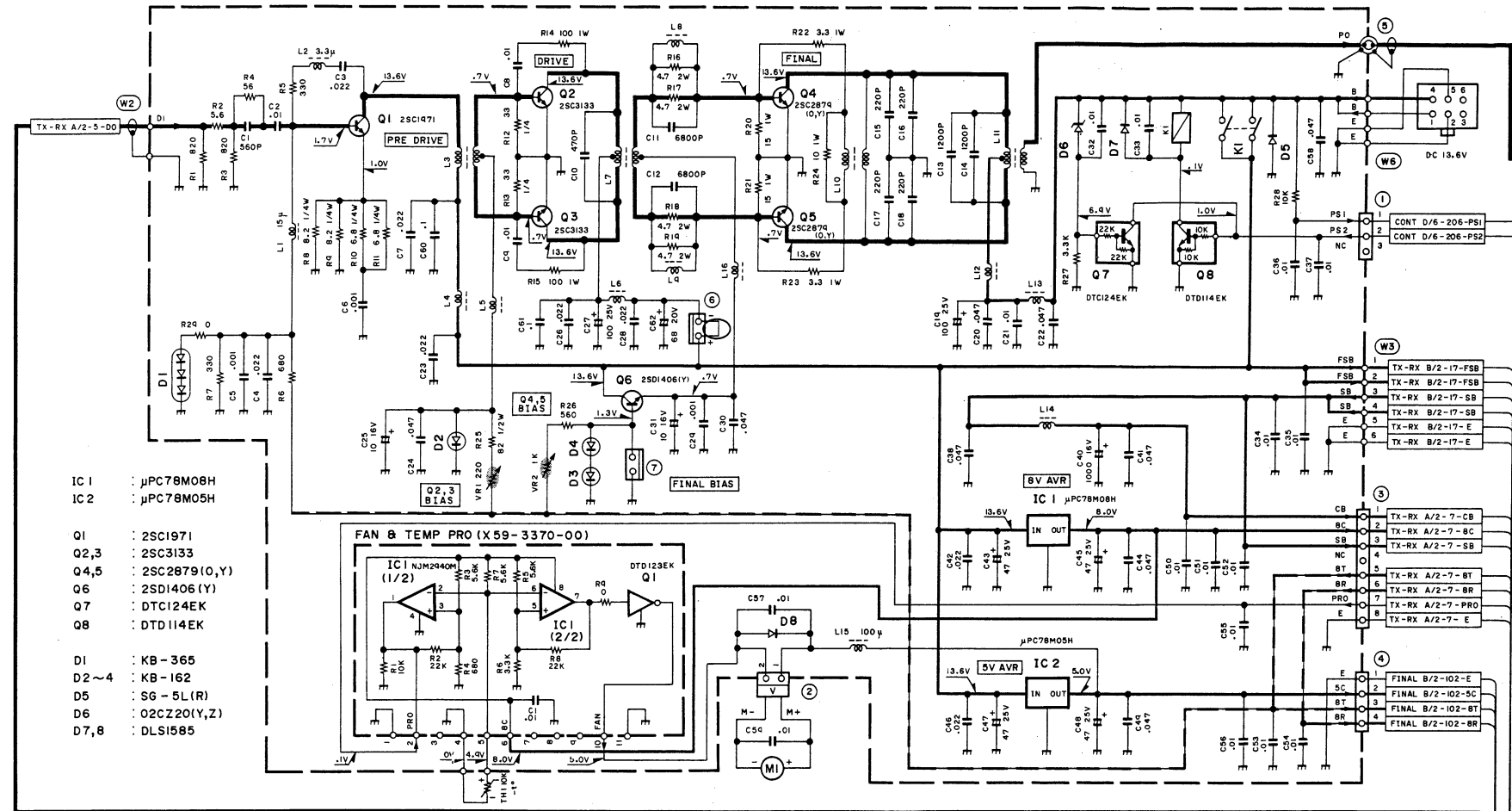
μPC78M05H  
μPC78M08H



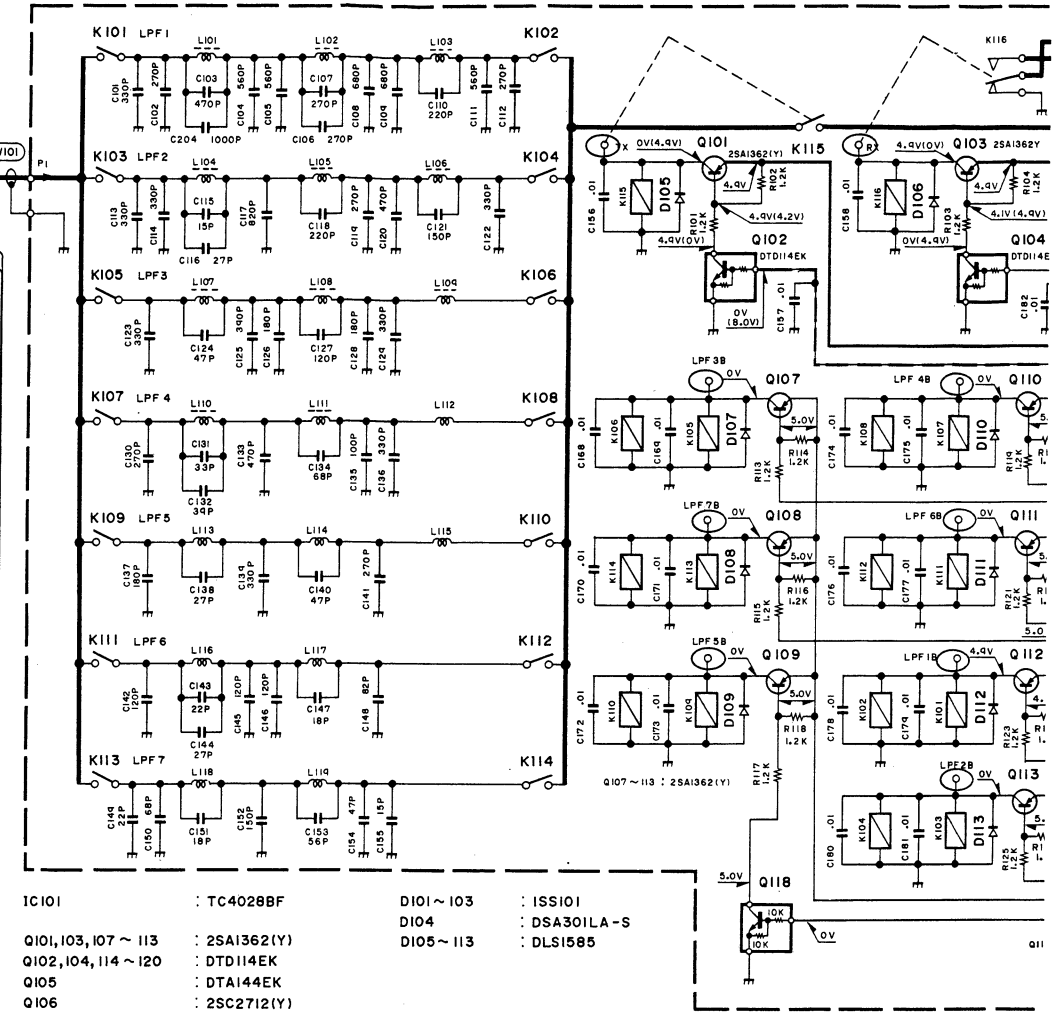
TC4028BF



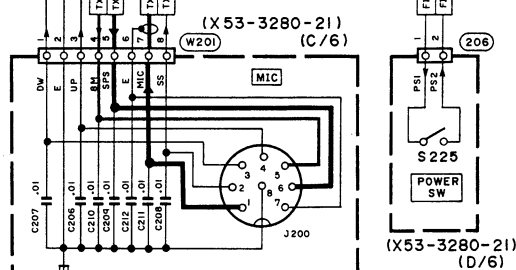
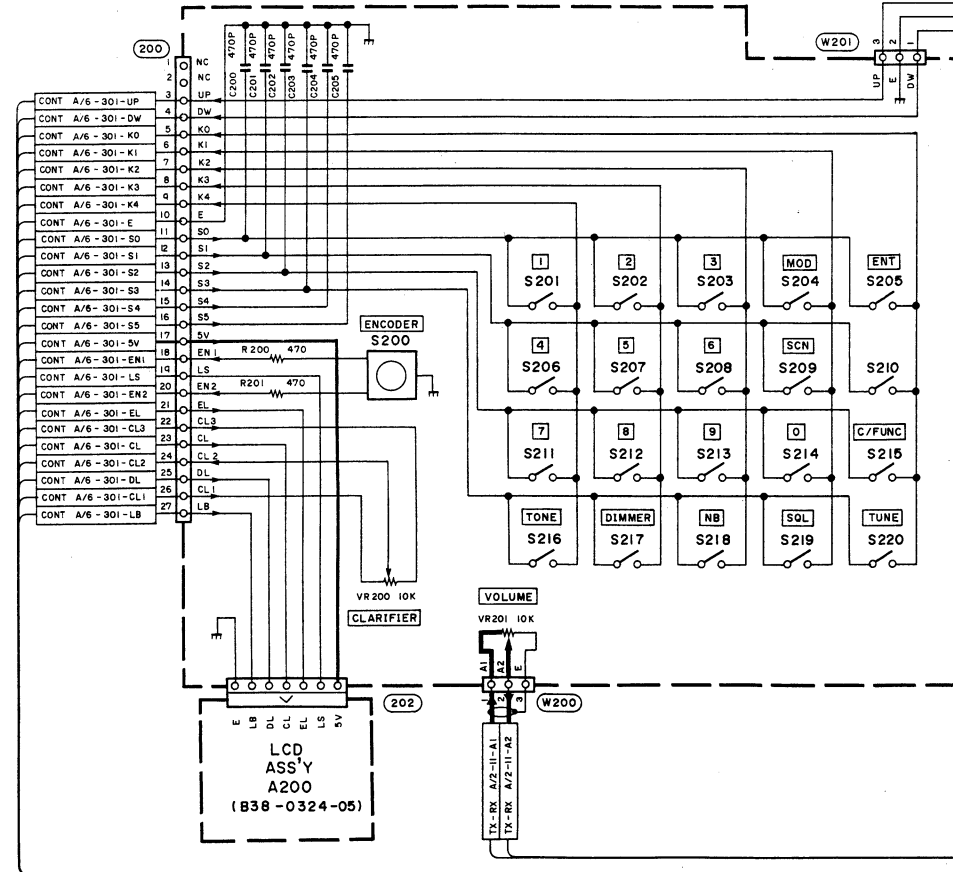
FINAL UNIT (X45-3370-21)(A/2)



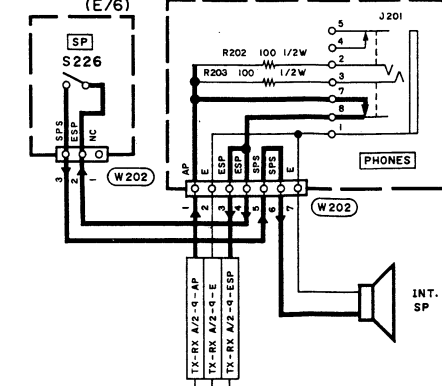
FINAL UNIT (X45-3370-21)(B/2)



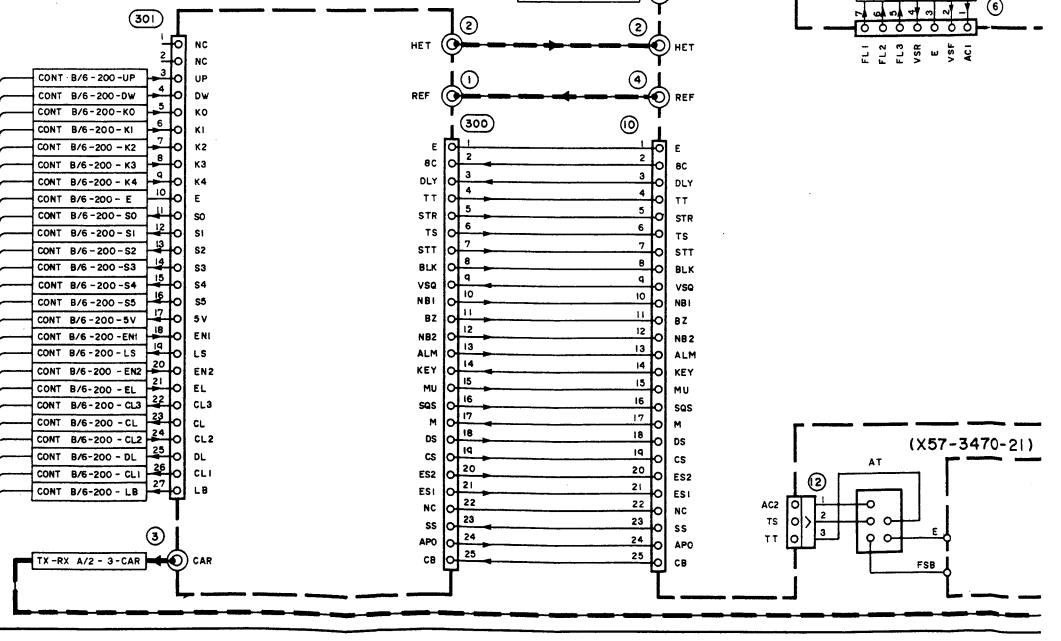
CONTROL UNIT (X53-3280-21)(B/6)



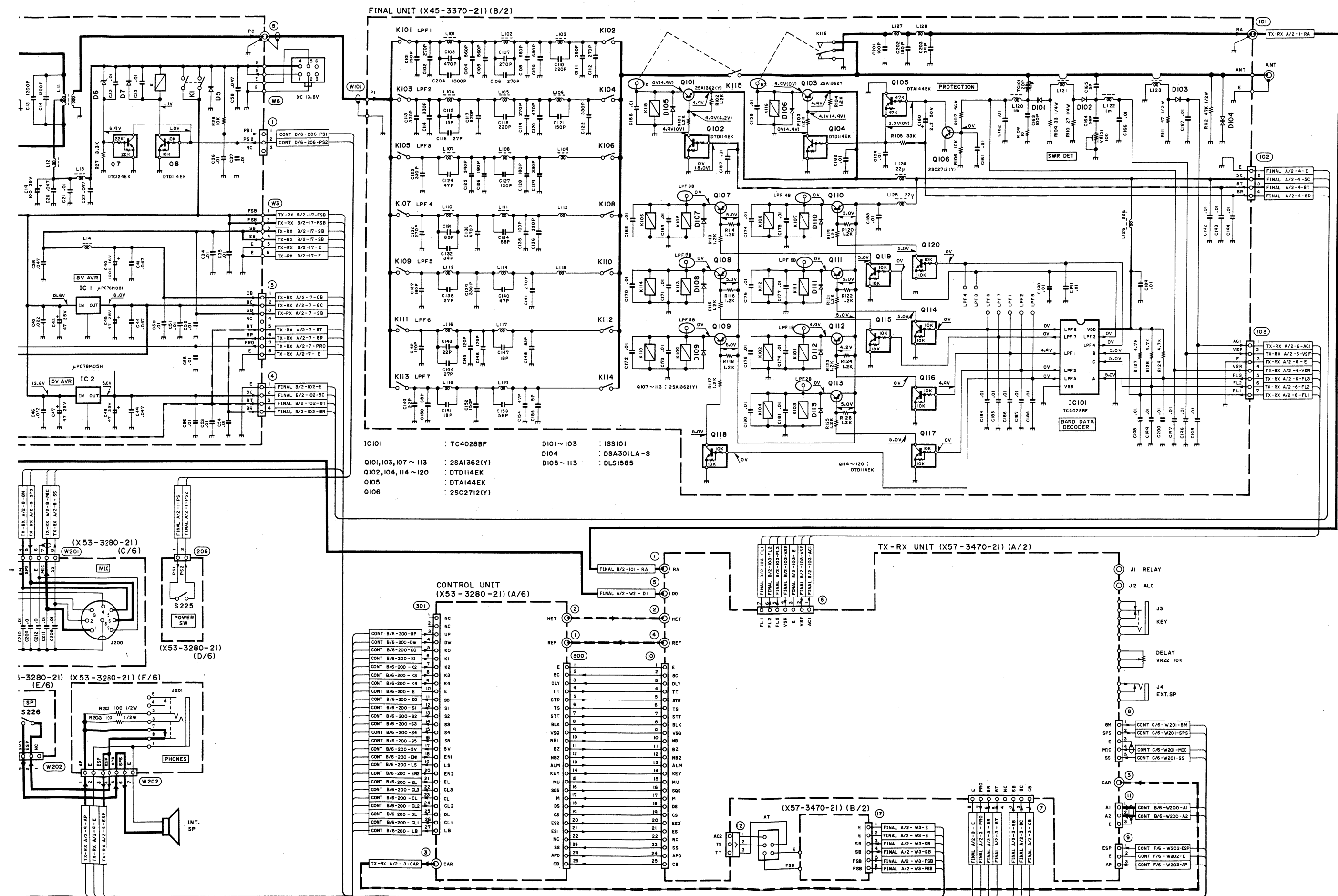
(X53-3280-21)(E/6)



CONTROL UNIT (X53-3280-21)(A/6)



# SCHEMATIC DIAGRAM TRC-70





Circuit Description

• Tuning

The MAT-100 is a high-frequency band automatic antenna tuner that can be remotely controlled. When tuning with a remote controller, the TS terminal of the control cable goes low and a tuning start signal is sent. When the MAT-100 detects that the TS terminal is low, the CPU is reset in order to start tuning. A tuning signal is sent from the remote controller to the sensor circuit of the MAT-100.

The sensor circuit detects the frequency count, forward voltage, reflected voltage, impedance, and phase voltage and sends the data to the CPU. The CPU then activates a tuning circuit relay to enter the tuning state. An LED indicator goes on to indicate the relay operation status. When tuning starts, the CPU memorizes the tuning state. When tuning with the same frequency, the current data is used and the tuning state is entered.

When tuning is completed, the TT terminal is set to high to send a termination signal. When the MAT-100 detects the termination signal, the STBY signal goes low to return the TS signal to high. The standby mode is then entered to stop the clock.

When DIP switch S4 of the LED unit (W02-0883-08) is set to MANUAL, tuning can be performed manually. The relay switch can be controlled with switches S1 through S3.

• Through mode

The MAT-100 can be set in the through mode in which an antenna and the remote controller are directly connected. In this case, the TT terminal of the remote controller goes low. The MAT-100 detects that the TT terminal is low. The CPU sets a relay through mode. When mode setting is completed, the CPU enters the standby mode.

• Tuning test

The MAT-100 has a TUNING START switch to test tuning or adjust an antenna. To test tuning, the MAT-100 must be connected to a remote controller with the POWER switch ON. When push-button switch S1 of the MAT-100 is pressed, tuning starts. Push-button switch S1 sets the TS terminal low and sends a tuning start command to the remote controller. When a tune signal is sent from the remote controller, the MAT-100 starts tuning. When tuning is performed normally, the test operation is completed.

**Note :** When tuning cannot be performed within 15 seconds, a tuning termination command is issued by the remote controller.

• Interface

Control signals are sent and received between the MAT-100 and remote controller using the TS and TT terminals. The TS and TT terminals are bi-directional signal lines.

1. Normal tuning

When the tuning state is set with a remote controller, the TS signal of the remote controller is set low (usually set to high). When the MAT-100 detects that the TS signal is low, the CPU clock is activated to reset the system. At this time, the CPU is activated to check the TS and TT signal status. The CPU sets the TT signal low and reports tuning start. When the TT signal goes low, the remote controller issues a tuning signal. When the MAT-100 completes tuning, the TT signal is returned to high to indicate completion. The tuning signal from the remote controller stops. The TS signal is set to high to complete the tuning. When the TS signal is set to high, the MAT-100 enters the standby mode and stops the clock operation.

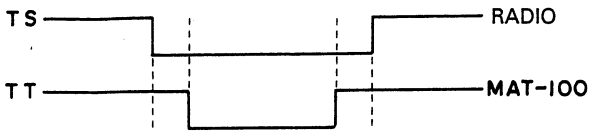
2. Abnormal tuning

The remote controller counts for 15 seconds after the TS signal is set low and the TT signal is set to high. If the TT signal is not set low before the count is completed, the MAT-100 judges that tuning can not be performed normally. The remote controller then sets the TS signal to high and reports a tuning interruption. When the TS signal is set to high, the MAT-100's CPU returns the TT signal to high to stop tuning. The MAT-100 then enters the standby mode.

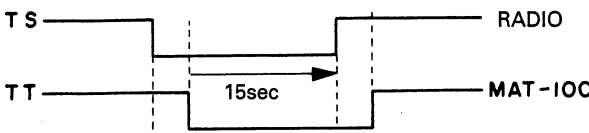
3. Through operation

When the TT signal from the remote controller is set low, a through operation is performed. The MAT-100 activates the CPU and sets the TS signal low. The remote controller then returns the TT signal to high. When tuning is completed, the MAT-100 returns the TS signal to high and sets the CPU in the standby mode to complete the through operation.

For tuning



For abnormal tuning



For through operation

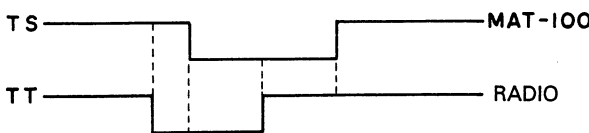


Fig. 1 Interface timing chart

• Manual Tuning

The MAT-100 can set the manual tuning. For manually tuning, change DIP switch S4 of the LED unit from AUTO to MANUAL. When DIP switch S4 is set to MANUAL, relays K1 and K2 are selected so that a sensor circuit is through-connected. LED indicator D48 goes on to indicate tuning completion.

When DIP switches S1 through S3 are selected, relays K1 and K2 are set on or off. The status of S1 through S3 is sent to IC10 through IC13 of the MAT-100 to drive the relays. Table 1 gives the relationships between the DIP switch settings and operation of the relays.

• Control cable terminals

- +13.6 V MAT-100's +13.6 V DC
- GND Ground
- TS Bidirectional control terminal that controls tuning start and completion via a remote controller and reports through start and completion via the MAT-100.
- TT Bidirectional control terminal that controls through start and completion via a remote controller and controls tuning start and completion via the MAT-100.
- GND Ground
- ANT.C Determines the antenna current via the MAT-100 and sends it to the remote controller.

• Tuning Circuit Selection

The tuning circuit is used as a PI matching circuit by connecting jumpers J5 and J6. When the tuning circuit is not matched using a PI match, remove the PI circuit and use an L-type matching circuit. The PI circuit is normally used.

DIP switch	RElay No.	DIP switch-on sequence operation
S1	1	K-3
	2	4
	3	5
	4	6
	5	7
	6	8
	7	9
	8	10
	9	11
	10	13
S2	1	14
	2	12
	3	15
	4	16
	5	17
	6	18
	7	19
	8	20
	9	21
	10	22
S3	1	23
	2	24

Table 1 DIP switch and relay number

- ④ AC
- ⑤ TS
- ⑥ FS

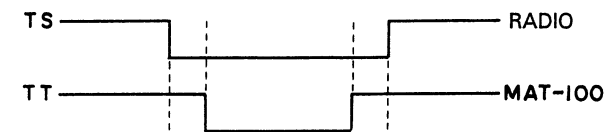
• Sens

An at  
serted in  
duce ur  
signals a  
terminal  
The f  
signal al  
block.  
The f  
HF sign  
L13, R9  
ing D1 a  
verter.  
The  
signal fo  
cient op  
The f  
buffers  
and D4  
ance sig  
a 50-oh  
Volta  
sisting  
other, tl  
Input

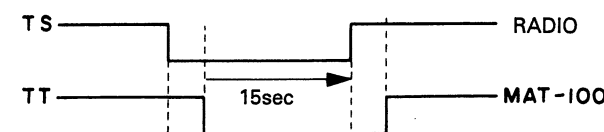
# TRC-70

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### For tuning



### For abnormal tuning



### For through operation

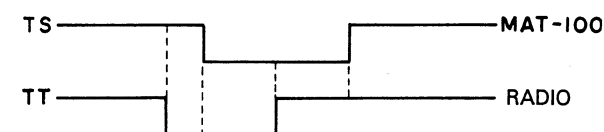


Fig. 1 Interface timing chart

### • Manual Tuning

The MAT-100 can set the manual tuning. For manually tuning, change DIP switch S4 of the LED unit from AUTO to MANUAL. When DIP switch S4 is set to MANUAL, relays K1 and K2 are selected so that a sensor circuit is through-connected. LED indicator D48 goes on to indicate tuning completion.

When DIP switches S1 through S3 are selected, relays K1 and K2 are set on or off. The status of S1 through S3 is sent to IC10 through IC13 of the MAT-100 to drive the relays. Table 1 gives the relationships between the DIP switch settings and operation of the relays.

### • Control cable terminals

- +13.6 V MAT-100's +13.6 V DC
- GND Ground
- TS Bidirectional control terminal that controls tuning start and completion via a remote controller and reports through start and completion via the MAT-100.
- TT Bidirectional control terminal that controls through start and completion via a remote controller and controls tuning start and completion via the MAT-100.
- GND Ground
- ANT.C Determines the antenna current via the MAT-100 and sends it to the remote controller.

### • Tuning Circuit Selection

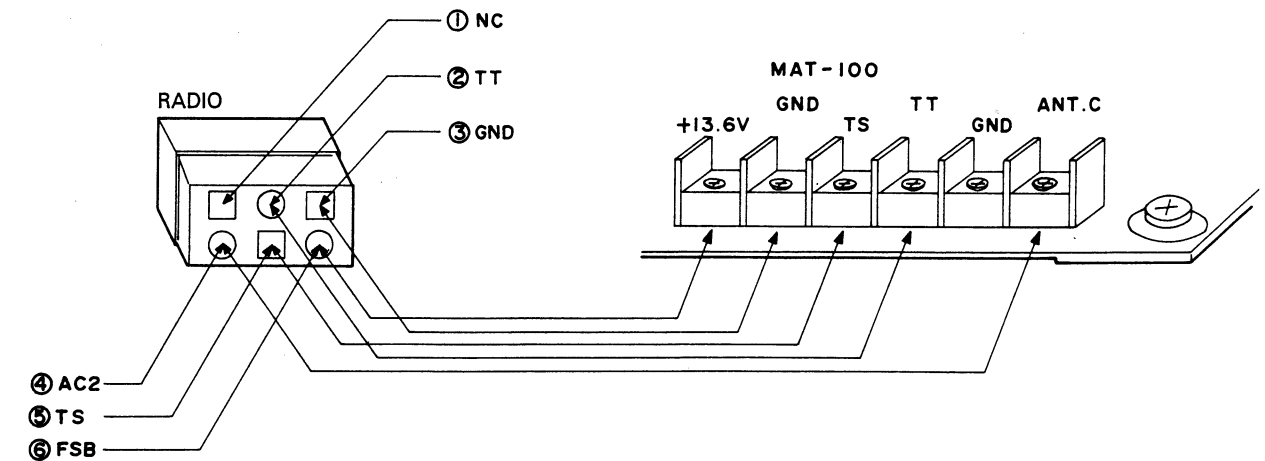
The tuning circuit is used as a PI matching circuit by connecting jumpers J5 and J6. When the tuning circuit is not matched using a PI match, remove the PI circuit and use an L-type matching circuit. The PI circuit is normally used.

DIP switch	RElay No.	DIP switch-on sequence operation
S1	1	K-3
	2	4
	3	5
	4	6
	5	7
	6	8
	7	9
	8	10
	9	11
	10	13
S2	1	14
	2	12
	3	15
	4	16
	5	17
	6	18
	7	19
	8	20
	9	21
	10	22
S3	1	23
	2	24

Table 1 DIP switch and relay number

# TRC-70

## MAT-100 (AUTOMATIC ANTENNA TUNER)



### MAT-100

Pin name	Description
+13.6V	13.6VDC input
GND	Ground
TS	Control signal input/output
TT	Control signal input/output
GND	Ground
ANT. C	Antenna current output

### TRC-70

Pin name	Description
NC	Unused
TT	Control signal input/output
GND	Ground
AC2	Antenna current
TS	Control signal input/output
FSB	Tuner power output

Fig. 2 Control cable connection

### • Sensor block

An attenuator consisting of R1 through R7 is inserted into the sensor to stabilize impedance and reduce unwanted waves during tuning. High power signals are input from the remote controller to the J1 terminal and passed through this attenuator.

The high power signal is tapped off from the main signal and passed through R11 to the frequency read block.

The forward wave and reflected wave signals of the HF signal are detected by a coupler consisting of L12, L13, R9, and R10; converted into a control voltage using D1 and D2; then sent to the analog-to-digital converter.

The converted digital signal is used as an input signal for the input power check and reflection coefficient operation.

The forward and reflected waves are sent through buffers Q1 and Q2 to a DBM consisting of L16, L17, and D47 and sent to comparator IC15 (1/2) as impedance signal IZI. Impedance signal IZI is compared with a 50-ohm impedance.

Voltage and current signals are sent to a DBM consisting of L14, L15, and D46; compared with each other, then extracted as a phase signal.

Input power level range : 8~15 W

### 1. Overpower

When power exceeding approximately 20 W is detected during the power check, a 100 ms counter is set. When a tuning start (TS) is canceled after 100 ms or within 100 ms, the through mode is entered.

- 1 : Power check
- 2 : TS check
- 3 : Returned to 1 if within 100 ms

\* If the power is proper in step 1, stop the above operation and proceed to the next operation.

## MAT-100 (AUTOMATIC ANTENNA TUNER)

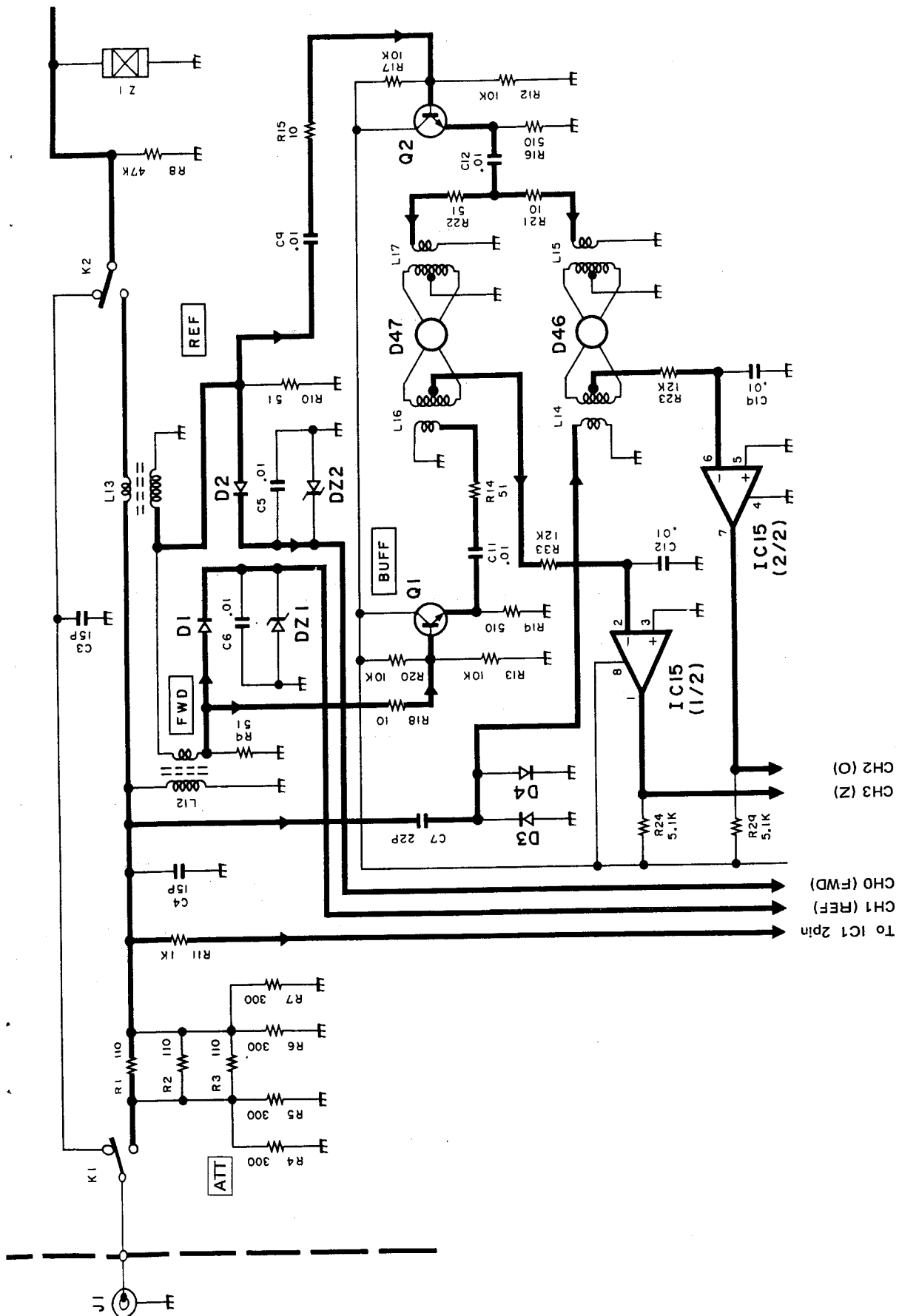


Fig. 3 Sensor circuit (Forward and reflected waves)

# TRC-70

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### • Frequency read block

The HF signal obtained by the sensor circuit is passed through a limiter consisting of C18, C21, D6, and D7, then sent to frequency divider IC1 (1/16) ( $\mu$ PB553AC). The output level of IC1 is ECL level, so it is converted to TTL level by buffer amplifier Q9, then fed to counter IC2.

The CPU controls the counter at the timing shown in the Figure 4. The counter is cleared with a reset signal, a pulse of this duration is counted with a gate signal, and the count value is latched with a load signal. Meanwhile, data is sent from terminals 1 through 4. For terminals  $10^0$ ,  $10^1$ ,  $10^2$ , and  $10^3$ , a digit signal to indicate the data digit is output in an internal free-running period of approximately 700 Hz. IC3 is used to

control the bus line output. When an OE terminal is high, data is output to the bus line.

The above operation is performed only once during tuning start.

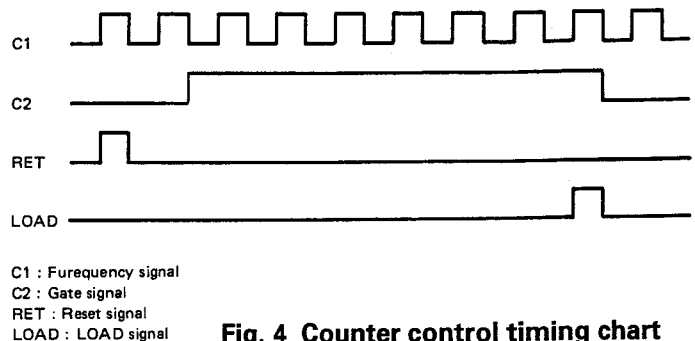


Fig. 4 Counter control timing chart

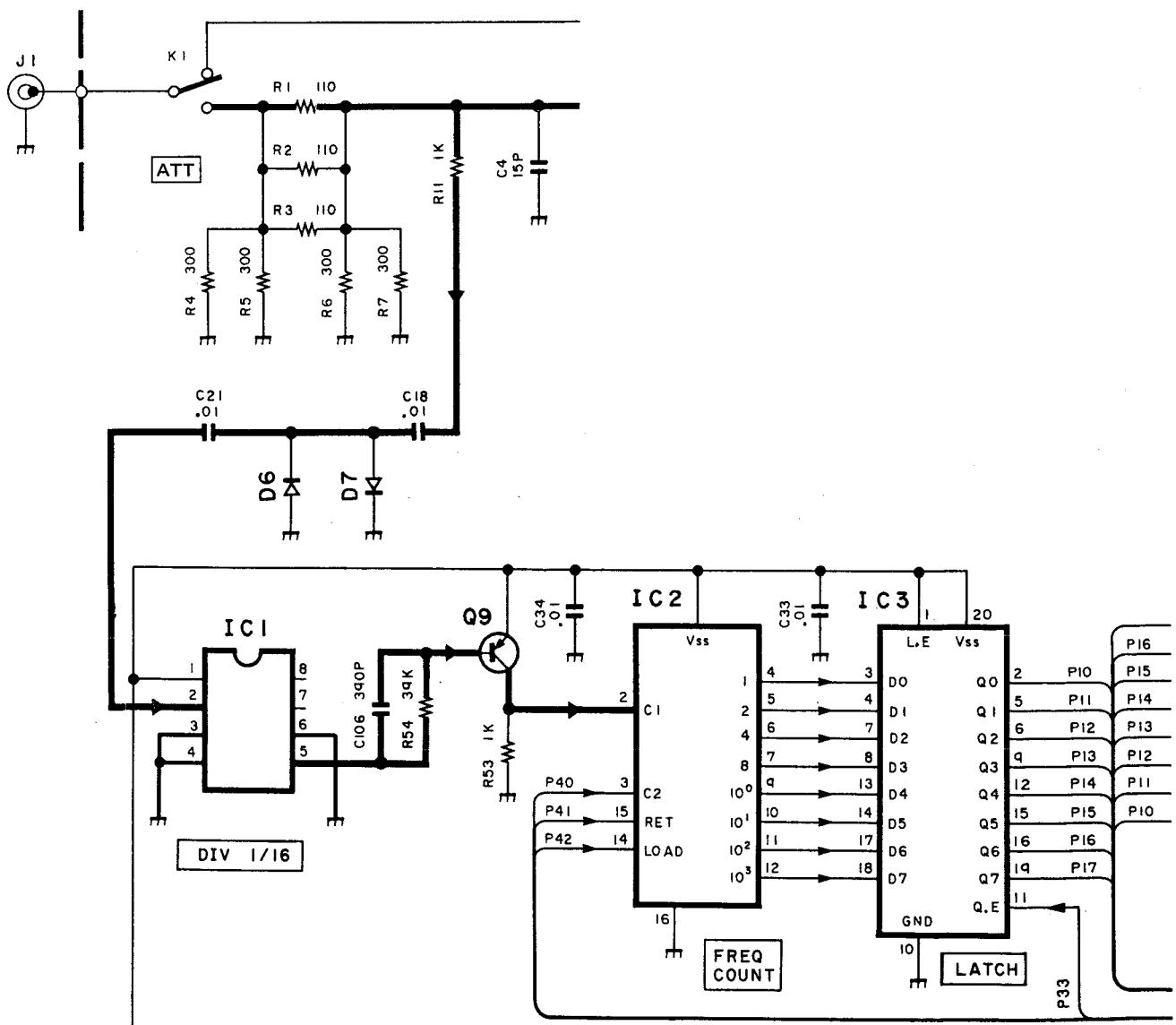


Fig. 5 Frequency read block

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### • A/D converter

The forward wave, reflected wave, phase, and impedance  $|Z|$  voltages obtained by the sensor circuit are

input to IC4. The CPU converts the signal voltage to an 8-bit digital signal and loads it, as required.

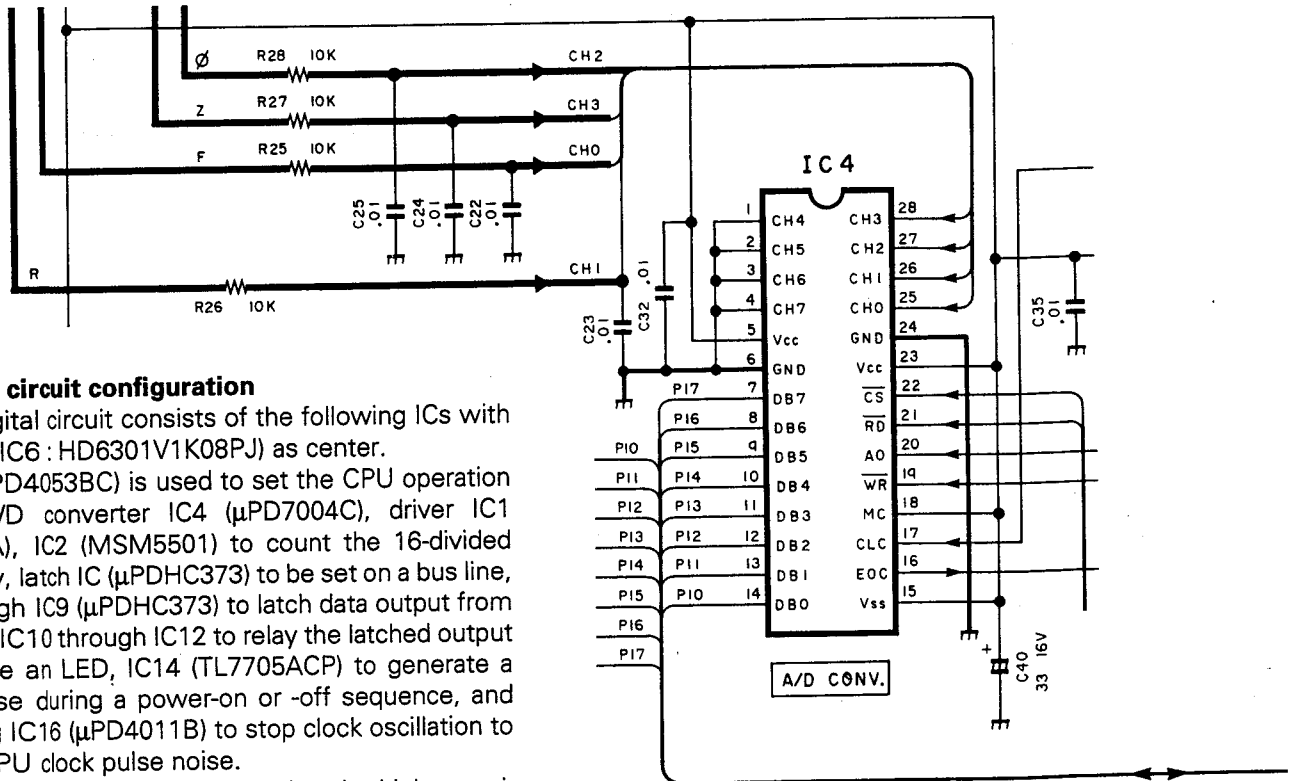


Fig. 6 A/D converter circuit

### • Digital circuit configuration

The digital circuit consists of the following ICs with the CPU (IC6: HD6301V1K08PJ) as center.

IC5 ( $\mu$ PD4053BC) is used to set the CPU operation mode, A/D converter IC4 ( $\mu$ PD7004C), driver IC1 ( $\mu$ PB553A), IC2 (MSM5501) to count the 16-divided frequency, latch IC ( $\mu$ PDHC373) to be set on a bus line, IC7 through IC9 ( $\mu$ PDHC373) to latch data output from the CPU, IC10 through IC12 to relay the latched output or to drive an LED, IC14 (TL7705ACP) to generate a reset pulse during a power-on or -off sequence, and switching IC16 ( $\mu$ PD4011B) to stop clock oscillation to reduce CPU clock pulse noise.

The RAM in the CPU is backed up by high-capacitance capacitor C39 (0.22 F) to retain the memory data items.

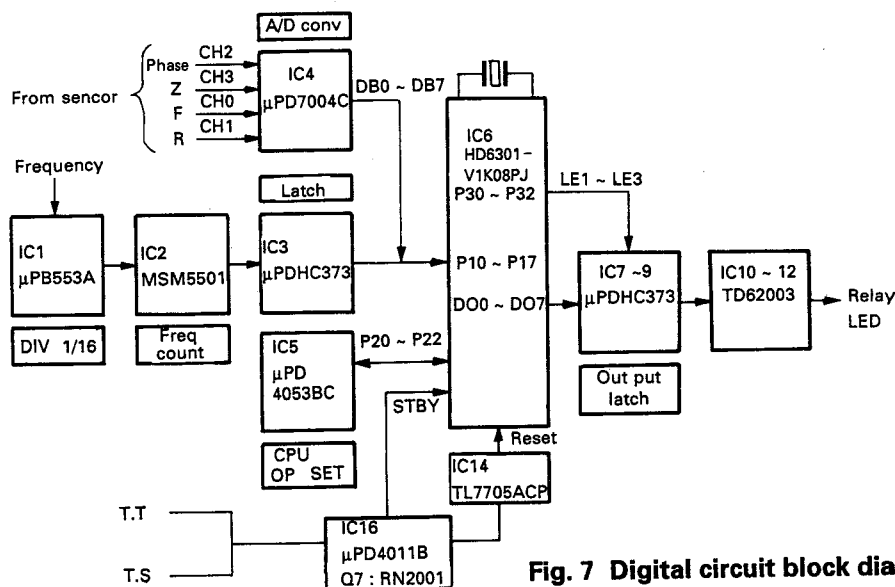


Fig. 7 Digital circuit block diagram

### • Output block

Data processed by the CPU is output in 8-bit units, added to a latch pulse sequentially from IC7, then sent to IC9. A relay or LED is then driven by drivers IC10 through IC13.

When output enable circuits IC7 through IC9 are controlled, the relay circuit is manually activated and surge current is reduced during the power-on sequence.

## MAT-100 (AUTOMATIC ANTENNA TUNER)

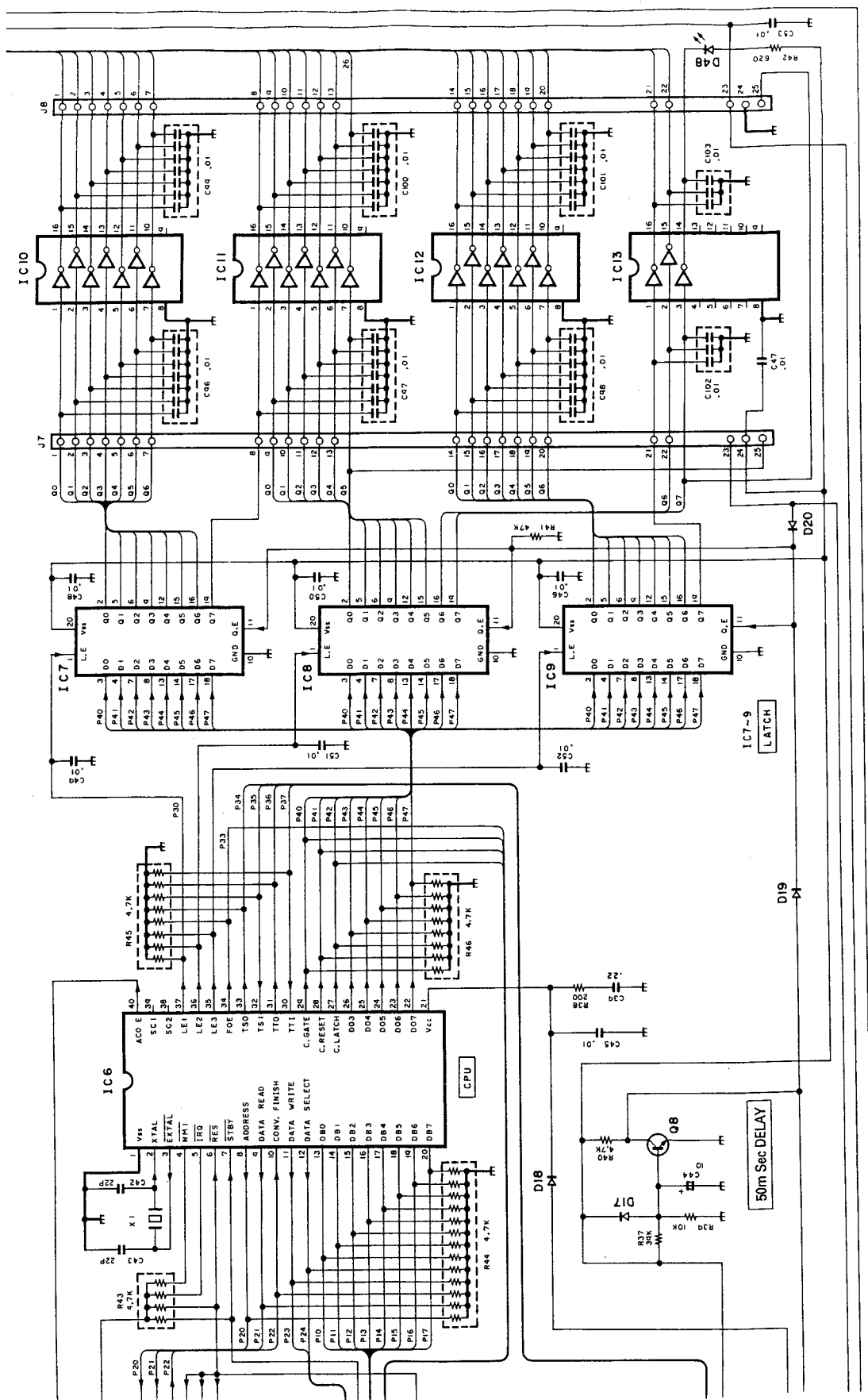


Fig. 8 Output block

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### • Mode setting block

To set the CPU, terminals P20 through P22 of IC6 must be set high when activating the CPU. P20 through P22 control A/D converter IC4. Therefore, a signal is selected using IC5.

A reset signal is output from pin 5 of IC14 during mode selection. When the reset signal output is added to the A, B, and C terminals of IC5, terminals X0, Y0, and Z0 are selected. The terminal level is output to terminals X, Y, and Z and added to the P20, P21, and P22 terminals of IC6.

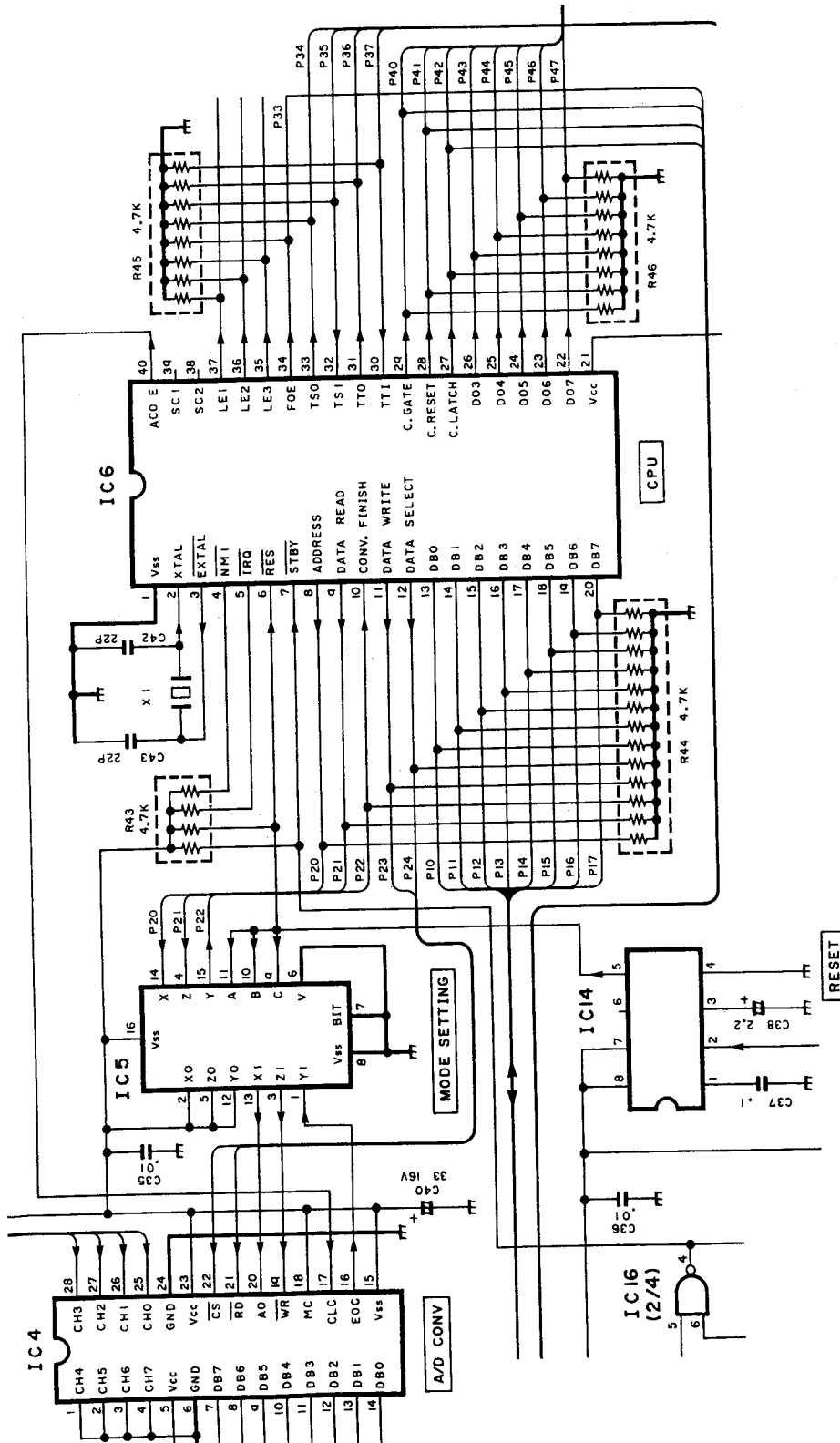


Fig. 9 Mode setting block

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### • CPU standby operation and interface

The STBY signal is low and the CPU stops the clock oscillation, then enters the standby mode. When a TS or TT signal is set low in the standby mode, the TS signal sets the STBY signal high using Q4, IC16 (3/4), and IC16 (2/4). The TT signal sets the STBY signal high using Q6, IC16 (1/4), and IC16 (2/4).

The MAT-100 then exits the standby mode. When the STBY signal is set high, it is delayed by the time constant of R55 and C29, and pin 2 of IC14 is set high. When this terminal is set high, a reset signal (low) of the duration determined by C38 is output from pin 5.

When the reset signal is set high, the CPU starts operation. IC4 checks the P35 and P37 outputs, that is, the Q4 and Q6 outputs and judges whether the

drive signal is a TS or TT signal. A tuning or through operation is then performed.

When S4 is set to MANUAL, the STBY signal remains low by ORing diodes D13, D16, and R50. At this time, the CPU cannot be activated. A high signal is added to the base of Q8 via D12 during a power-on sequence, but it is delayed by the time constant determined by R37 and C44. This delay enables the STBY signal to be set high via D15 (D15, D9, and R35 are diode-ORed) using IC16 (3/4) and IC16 (2/4). This is done to initialize the CPU.

When the TS and TT signals are set high, the STBY signal is set low using Q4, Q6, IC16 (3/4), IC16 (1/4), and IC16 (2/4). The CPU thus enters the standby mode.

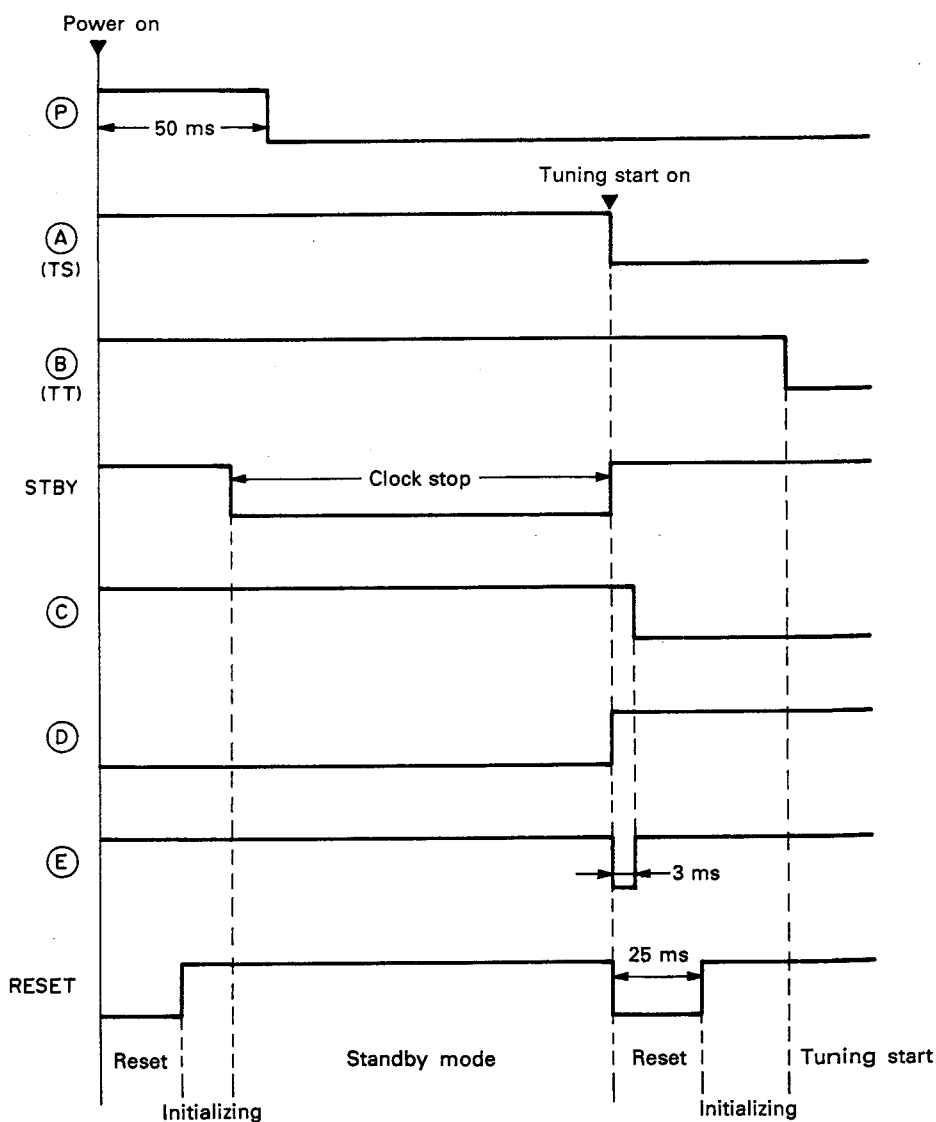


Fig. 10 Tuning start





Auto: "L"  
Manual: "H"

## MAT-100 (AUTOMATIC ANTENNA TUNER)

- **LED unit**

This circuit consists of LED indicators D1 through D22, AUTO/MANUAL selector switch S4, and switches S1 through S3 to operate an LC tuning circuit relay during manual operation. LED indicators D1 through D22 go on when the corresponding LC tuning circuit relay is set on. The LED unit is also connected to J7 and J8 on the main unit's board via sockets J1 and J2.

AUTO or MANUAL is selected with switch S4. In the auto mode, ground (GND) is connected to pin 23 of J1 (output enable terminal of IC7, IC8, and IC9 on the main unit's board). In the manual mode, 5.3 V is connected to pin 23 of J1 as in auto mode.

In the manual mode, a voltage is applied to pins 1 through 22 of J1 (S1 through S3 are set to OFF). When switches S1 through S3 are set to ON, the voltage goes low. As a result, IC10 through IC13 on the main unit's board and the LC tuning circuit relay are activated.

### **1. Manual mode operation**

When S1 through S3 set to OFF, the relay is set on and the corresponding LED indicator goes on.

When S1 through S3 are set to ON, the relay is set off and the corresponding LED indicator goes off.

### **2. Auto mode operation**

The relay is set on and the corresponding LED indicator goes on irrespective of the setting of switches S1 through S3.

## MAT-100 (AUTOMATIC ANTENNA TUNER)

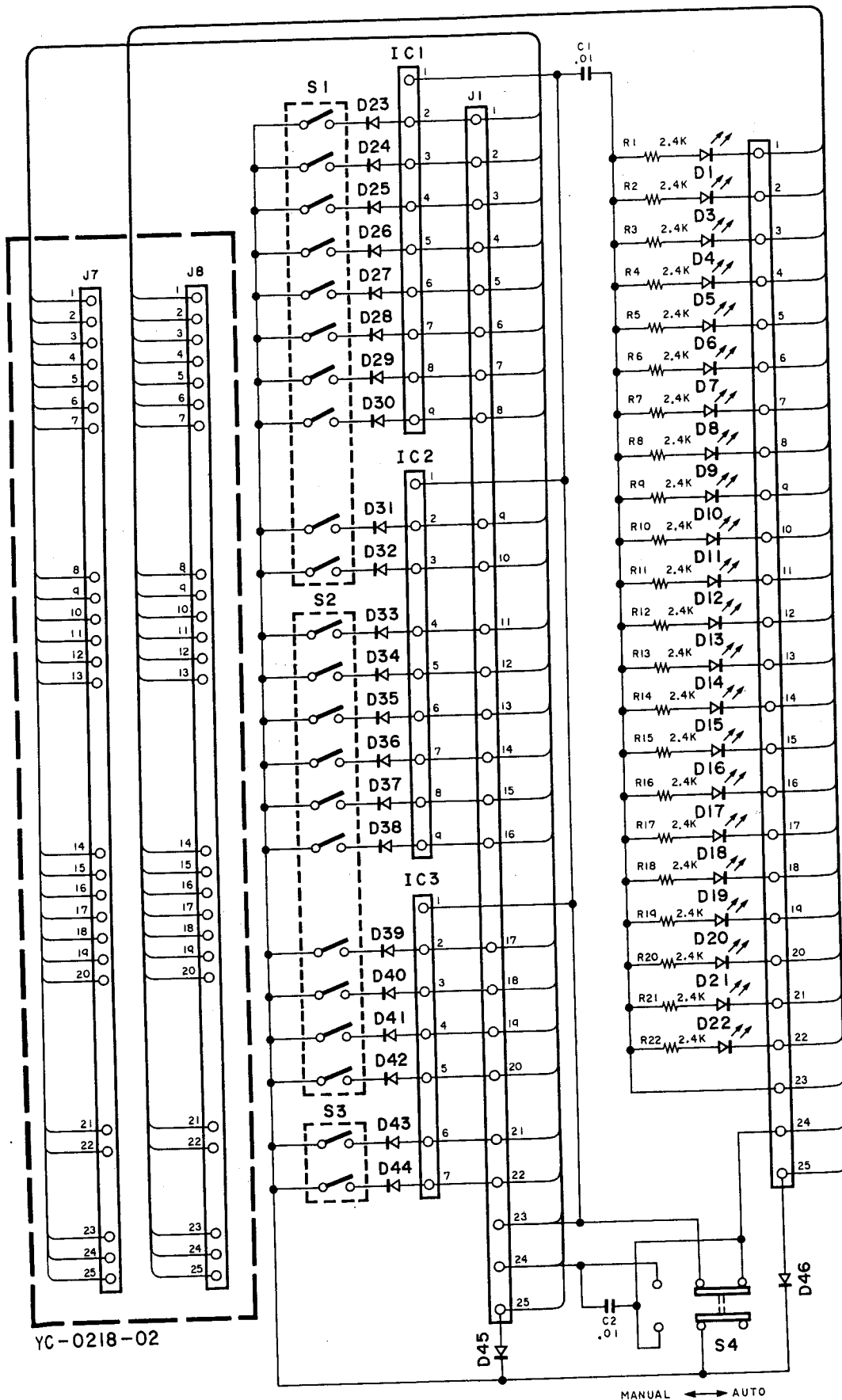


Fig. 12 LED unit

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### • LC tuning circuit

This circuit is used for antenna tuning. It consists of coils L1 through L11 to enable a false and linear change, capacitors C76 through C92, and relays K3 through

K24 to set capacitors on or off. Capacitors can be set to IN (TX) or OUT (ANT) by relays K12 and K15. These relays are driven by a signal from the CPU.

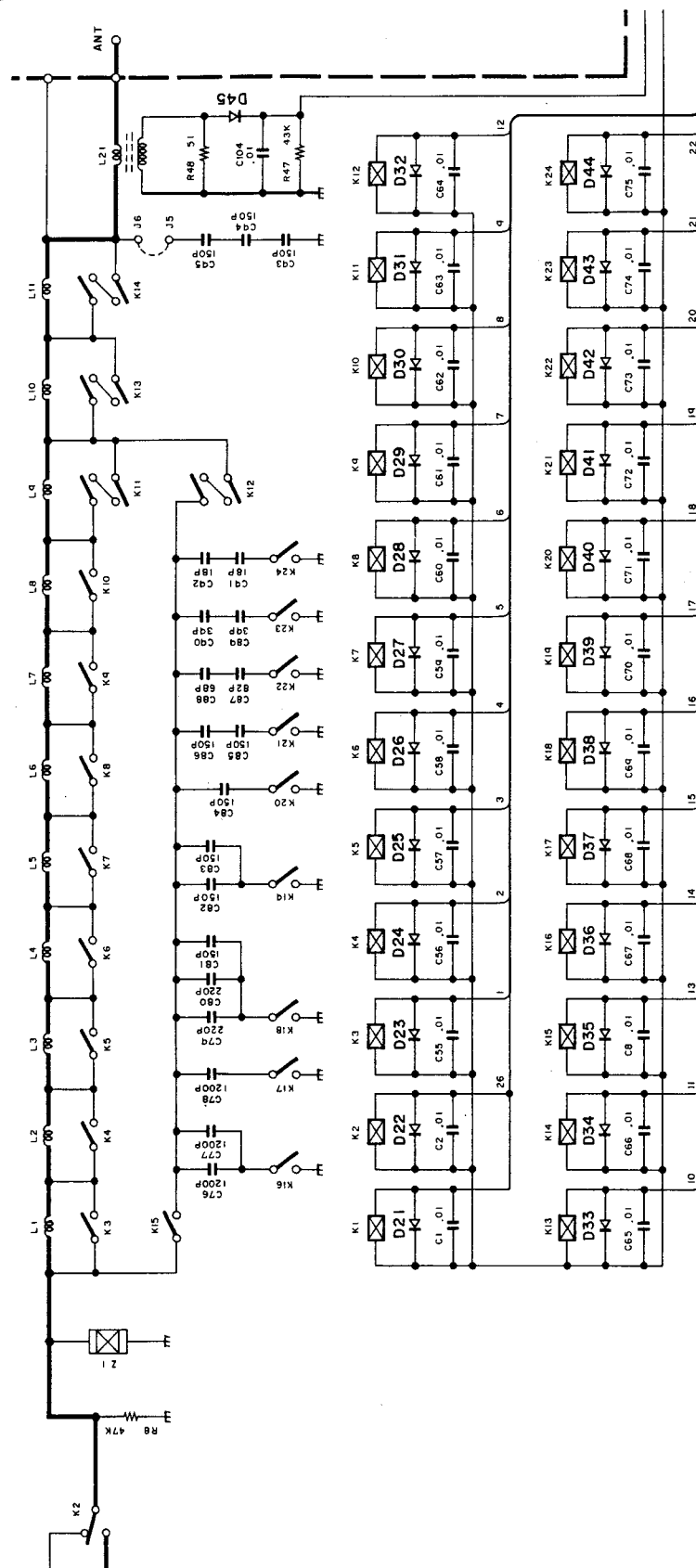


Fig. 13 LC tuning circuit

# MAT-100 (AUTOMATIC ANTENNA TUNER)







	Port name	Pin No.	Name	Function	I/O	Remarks
Control signal	Vss	1	Vss	Ground terminal	-	
	XTAL	2	XTAL	Crystal connection terminal	I	
	XTAL	3	XTAL	Crystal connection terminal	O	
	NMI	4	-		-	
	IRQ	5	-		-	
	RES	6	RES	CPU reset terminal	I	
	STBY	7	STBY	CPU clock stop terminal	I	"L" : Stop
2 ports	P20	8	AO	A/D control address signal	O	
	P21	9	WR	A/D data read signal	O	
	P22	10	EOC	A/D conversion end signal	I	"L" : Conversion end
	P23	11	RD	A/D data write signal	O	
	P24	12	CS	A/D chip select signal	O	"L" : Select
1 ports	P10	13	DB0	A/D conversion, counter data bus	I/O	
	P11	14	DB1	A/D conversion, counter data bus	I/O	
	P12	15	DB2	A/D conversion, counter data bus	I/O	
	P13	16	DB3	A/D conversion, counter data bus	I/O	
	P14	17	DB4	A/D conversion, counter data bus	I/O	
	P15	18	DB5	A/D conversion, counter data bus	I/O	
	P16	19	DB6	A/D conversion, counter data bus	I/O	
	P17	20	DB7	A/D conversion, counter data bus	I/O	
4 ports	Vcc	21	Vcc	Power terminal	-	
	P47	22	DO7	Relay output signal	O	
	P46	23	DO6	Relay output signal	O	
	P45	24	DO5	Relay output signal	O	
	P44	25	DO4	Relay output signal	O	
	P43	26	DO3	Relay output signal	O	
	P42	27	DO2/L	Relay output signal / counter latch signal	O	
	P41	28	DO1/R	Relay output signal / counter reset signal	O	
	P40	29	DO0/G	Relay output signal / counter gate signal	O	
3 ports	P37	30	TTI	Through mode drive input	I	"H" : Drive
	P36	31	TTO	Through mode response output	O	"H" : Response
	P35	32	TSI	Tune mode drive input	I	"H" : Drive
	P34	33	TSO	Tune mode response output	O	"H" : Response
	P33	34	FOE	Frequency read circuit's separated signal	O	"H" : Separation
	P32	35	LE3	Output latch pulse 3	O	
	P31	36	LE2	Output latch pulse 2	O	
	P30	37	LE1	Output latch pulse 1	O	
	SC2	38	-		-	
	SC1	39	-		-	
	E	40	ACO	A/D clock output terminal	O	1/4 of clock

Table 2 CPU : HD6301V1K08PJ (IC6) terminal function

## MAT-100 (AUTOMATIC ANTENNA TUNER)

# MAT-100 (AUTOMATIC ANTENNA TUNER)

## Description of Components

### ANT MODULE UNIT (W02-0883-08)

Component	Use/Function	Operation/Condition/Compatibility
IC1	1/16 Divider	
IC2	1/16 Divider counter	BCD code.
IC3	Latch	High impedance level without frequency read.
IC4	A/D converter	CH0 FWD voltage. CH1 REF voltage. CH2 phase voltage. CH3 Impedance voltage.
IC5	CPU mode setting	CPU P20, 21, 22=High.
IC6	CPU	Single chip mode operation.
IC7~9	Output latch	Auto mode O, E=Low. Manual mode O, E=High.
IC10~13	Output driver	
IC14	Reset making	25ms.
IC15	Comparator	Phase is '+'=High, '-'=Low. IZI is 50Ω>High, 50Ω<Low
IC16	Switching	STBY, RESET TRIG occur.
IC17	AVR	6V 1A.
Q1, 2	Buffer	Q1 : REF wave, Q2 : FWD wave.
Q3, 5	Switching	Q3 : 'H' level when through mode response. Q5 : 'H' level when tune mode.
Q4, 6	Switching	Q4 : Turn to LOW when tune mode. Q6 : Turn to LOW when through mode.
Q7	Switching	RESET TRIG occur.
Q8	Switching	'H' 50m sec when power switch is turned ON.
Q9	Buffer	ELC level → TTL level.

### LED UNIT (W02-0884-08)

Component	Use/Function	Operation/Condition/Compatibility
IC1~3	Voltage supply	Network between diode resistor.

## MAT-100 (AUTOMATIC ANTENNA TUNER)

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Telle ohne Parts No. werden nicht geliefert.

### Parts List

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
<b>MAT-100</b>						
1	1A	*	A01-2001-08	CABINET(TOP)		
2	3B	*	A01-2002-08	CABINET(BOTTOM)		
		*	B40-7645-08	MODEL NAME PLATE		
		*	B41-0671-08	LABEL(CAUTION)		
		*	B42-3397-08	LABEL(KENWOOD)		
		*	B42-3398-08	LABEL(MAT-100)		
		*	B46-0420-00	WARRANTY CARD	K	
		*	B50-8357-08	INSTRUCTION MANUAL		
C1 ,2		*	CK45B1H103K	CERAMIC 0.010UF K		
C3 ,4		*	CM93CC2H150J	MICA C 15PF J		
C5 ,6		*	CK45B1H103K	CERAMIC 0.010UF K		
C7		*	CC45SL2H220J	CERAMIC 22PF J		
C8 -25		*	CK45B1H103K	CERAMIC 0.010UF K		
C27 ,28		*	CK45B1H103K	CERAMIC 0.010UF K		
C29		*	CS15E1C2R2M	TANTALUM 2.2UF 16WV		
C30		*	CK45B1H103K	CERAMIC 0.010UF K		
C31		*	CE04EW1C101M	ELECTRO 100UF 16WV		
C32 -37		*	CK45B1H103K	CERAMIC 0.010UF K		
C38		*	CS15E1C2R2M	TANTALUM 2.2UF 16WV		
C39		*	C90-2127-08	ELECTRO 0.22UF		
C40		*	CE04EW1C330M	ELECTRO 33UF 16WV		
C41		*	CE04EW1E470M	ELECTRO 47UF 25WV		
C42 ,43		*	CC45SL2H220J	CERAMIC 22PF J		
C44		*	CS15E1A100M	TANTALUM 10UF 10WV		
C45 -53		*	CK45B1H103K	CERAMIC 0.010UF K		
C55 -75		*	CK45B1H103K	CERAMIC 0.010UF K		
C76 -78		*	CM93D2H122J	MICA 1200PF J		
C79 ,80		*	C91-1112-08	MICA 220PF J		
C81 -86		*	C91-1111-08	MICA 150PF J		
C87		*	C91-1110-08	MICA 82PF J		
C88		*	C91-1109-08	MICA 68PF J		
C89 ,90		*	C91-1108-08	MICA 39PF J		
C91 -92		*	C91-1107-08	MICA 18PF J		
C93 -95		*	C91-1111-08	MICA 150PF J		
C96 -101		*	R90-0715-08	CAP.BLOCK 0.01 X7		
C102,103		*	R90-0716-08	CAP.BLOCK 0.01 X3		
C104		*	CK45B1H103K	CERAMIC 0.010UF K		
C106		*	CK45B2H391K	CERAMIC 390PF K		
		*	E09-0672-08	6P CONNECTOR(ACSY)		
		*	E23-0644-08	TERMINAL		
		*	E23-0645-08	TERMINAL		
		*	E23-0646-08	PIN CONNECTOR(ACSY)		
10	2A, 3B	*	E23-0647-08	HOLD LUG		
		*	E23-0652-08	TERMINAL		
		*	E31-6143-08	WIRE(RF-IF)		
		*	E31-6144-08	WIRE(ANT)		
		*	E31-6145-08	WIRE(GND)		
J1	1A	*	E04-0167-05	ANT. RECEPTACLE		
J2		*	E22-0671-08	TERMINAL		
J5 ,6		*	E23-0648-05	TERMINAL		
		*	E31-6142-08	CABLE ASSY(J5-J6)		
J7 ,8		*	E40-5379-05	PIN HEADER		

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

△ indicates safety critical components.



# MAT-100 (AUTOMATIC ANTENNA TUNER)

※ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
15	3B	*	E31-6150-08	CABLE ASSY(J9-J10)		
		*	F09-0427-08	INSULATING COVER(ACSY)		
		*	F10-1432-08	ATT SHIELD CASE		
		*	F10-1433-08	CPU SHIELD CASE		
		*	F10-1434-08	CPU SHIELD PLATE		
		*	F10-1435-08	LATCH SHIELD PLATE		
		*	F10-1436-08	SHIELD CASE(BOTTOM)		
		*	F10-1437-08	SHIELD PLATE		
		*	F29-0441-08	STAYER TIGHT BUSHING		
		*	F29-0442-08	SLEEVE		
16	2B	*	G13-0958-08	CUSHION		
17	3B	*	G53-0588-08	PACKING		
18	2A, 3B	*	G53-0589-08	PACKING		
		*	G53-0590-08	PACKING		
		*	G53-0592-08	RUBBER SLEEVE		
		*	H01-9650-08	ITEM CARTON		
		*	H25-0029-04	PROTECTION BAG(ACSY)		
		*	H25-0103-04	PROTECTION BAG(ACSY)		
		*	H25-0106-04	PROTECTION BAG(INSTRUCTION M.)		
		*	H25-0736-08	PROTECTION BAG(RADIO)		
20	1A	*	J21-4300-08	MOUNTING BLACKET(ACSY)		
21	3A, 3B	*	J21-4301-08	CONNECTOR MOUNT HARDWARE		
22		*	J21-4302-08	MOUNTING HARDWARE		
23	1A, 2B	*	J42-0469-08	CABLE CONNECTOR		
L1		*	L34-1293-08	COIL		
L2		*	L34-1294-08	COIL		
L3		*	L34-1295-08	COIL		
L4		*	L34-1296-08	COIL		
L5		*	L34-1297-08	COIL		
L6		*	L34-1298-08	COIL		
L7		*	L34-1299-08	COIL		
L8		*	L34-1300-08	COIL		
L9		*	L34-1301-08	COIL		
L10		*	L34-1302-08	COIL		
L11		*	L34-1303-08	COIL		
L12, 13		*	L39-0486-08	DETECTION COIL		
L14 -17		*	L39-0488-08	DETECTION COIL		
L18 -20		*	L33-0736-08	FERRI INDUCTOR		
L21		*	L39-0487-08	DETECTION COIL		
X1		*	L77-1428-08	XTAL RESONATOR 4.0MHZ		
A	3B	*	N09-2095-08	U. BOLT(ACSY)		
B	2B	*	N09-2096-08	HEX. BOLT(ACSY)		
C	2A, 3B	*	N09-2097-08	HEX. BOLT(ANT)		
		*	N09-2099-08	HEX. BOLT (M5X25)GND TERMINAL		
		*	N09-2100-08	SCREW(M5X10)MOUNTING HARD WARE		
D	2A, 3B	*	N09-2101-08	SELF TAPPING SCREW		
E	1A, 1B	*	N09-2102-08	MACHINE SCREW(M4X16) COVER		
		*	N10-2030-41	NUT(M3) AVR IC		
		*	N14-0546-08	NUT		
26	2A, 3B	*	N14-0547-08	WING NUT		
27	3A, 3B	*	N14-0548-08	NUT(M4) COVER		
		*	N15-1030-41	FLAT WASHER		
29	2A, 3B	*	N15-1050-60	FLAT WASHER		

E: Scandinavia & Europe K: USA P: Canada W:Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

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⚠ indicates safety critical components.

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× New Parts

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
31	2A, 3B	*	N16-0030-41	SPRING WASHER		
			N16-0050-60	SPRING WASHER		
F	1A, 2A		N30-2606-46	BINDING SCREW(M2.6X6)		
G	2A, 2B		N30-3006-46	BINDING SCREW(M3X6) AVR IC		
			N87-3008-46	SELF TAPPING SCREW(3X8)PC B.		
		*	N99-0344-08	SCREW SET		
R1 -3		*	RS14GB3D111J	FL-PROOF RS 110 J 2W		
R4		*	RS14GB3D301J	FL-PROOF RS 300 J 2W		
R7		*	RS14GB3D301J	FL-PROOF RS 300 J 2W		
R8			RD14BB2E473J	RD 47K J 1/4W		
R9 ,10			RD14BB2E510J	RD 51 J 1/4W		
R11			RD14BB2E102J	RD 1.0K J 1/4W		
R12 ,13			RD14CB2E103J	RD 10K J 1/4W		
R14		*	RD14CB2E510J	RD 51 J 1/4W		
R15			RD14CB2E100J	RD 10 J 1/4W		
R16		*	RD14CB2E511J	RD 510 J 1/4W		
R17			RD14CB2E103J	RD 10K J 1/4W		
R18			RD14CB2E100J	RD 10 J 1/4W		
R19		*	RD14CB2E511J	RD 510 J 1/4W		
R20			RD14CB2E103J	RD 10K J 1/4W		
R21			RD14CB2E100J	RD 10 J 1/4W		
R22		*	RD14CB2E510J	RD 51 J 1/4W		
R23			RD14CB2E123J	RD 12K J 1/4W		
R24			RD14CB2E512J	RD 5.1K J 1/4W		
R25 -28			RD14CB2E103J	RD 10K J 1/4W		
R29			RD14CB2E512J	RD 5.1K J 1/4W		
R32			RD14CB2E103J	RD 10K J 1/4W		
R33			RD14CB2E123J	RD 12K J 1/4W		
R34			RD14CB2E103J	RD 10K J 1/4W		
R35			RD14CB2E473J	RD 47K J 1/4W		
R36			RD14CB2E103J	RD 10K J 1/4W		
R37			RD14CB2E393J	RD 39K J 1/4W		
R38			RD14BB2E201J	RD 200 J 1/4W		
R39			RD14CB2E103J	RD 10K J 1/4W		
R40			RD14BB2E472J	RD 4.7K J 1/4W		
R41			RD14BB2E473J	RD 47K J 1/4W		
R41			RD14BB2E473J	RD 47K J 1/4W		
R42			RD14CB2E621J	RD 620 J 1/4W		
R43			R90-0286-05	MULTI-COMP 4.7KX4		
R44			R90-0452-05	MULTI-COMP 4.7KX12 J 1/4W		
R45 ,46			R90-0455-05	MULTI-COMP 4.7KX8 J 1/4W		
R47			RD14CB2E433J	RD 43K J 1/4W		
R48		*	RS14GB3D510J	FL-PROOF RS 51 J 2W		
R49 ,50			RD14CB2E472J	RD 4.7K J 1/4W		
R51 ,52			RD14CB2E101J	RD 100 J 1/4W		
R53			RD14CB2E102J	RD 1.0K J 1/4W		
R54			RD14CB2E393J	RD 39K J 1/4W		
R55			RD14CB2E472J	RD 4.7K J 1/4W		
K1 ,2		*	S51-1446-08	RELAY		
K3 -10		*	S51-1445-08	RELAY		
K11 -14		*	S51-2424-08	RELAY		
K15 -24		*	S51-1445-08	RELAY		
S1		*	S50-1426-08	SWITCH		

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

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 indicates safety critical components.

# MAT-100 (AUTOMATIC ANTENNA TUNER)

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
D1 ,2		*	2-1K261(1)	DIODE		
D3 ,4			1S1588	DIODE		
D5			U05B	DIODE		
D6 -11			1S1588	DIODE		
DZ1		*	05AZ3X	ZENER DIODE		
D12			10D1	DIODE		
D13 -20			1S1588	DIODE		
D21 -44			10D1	DIODE		
DZ2		*	05AZ3X	ZENER DIODE		
D45		*	2-1K261(1)	DIODE		
D46 ,47			ND487C2-3R	DIODE(DBM)		
D48			B30-0880-05	LED		
IC1			UPB553AC	IC		
IC2		*	MSM5501	IC		
IC3		*	UPD74HC373C	IC		
IC4		*	UPD7004C	IC		
IC5			TC4053BP	IC		
IC5			UPD4053BC	IC		
IC6		*	HD6301V1K08PJ	IC		
IC7 -9		*	UPD74HC373C	IC		
IC10 -13		*	TD62003P	IC		
IC14		*	TL7705ACP	IC		
IC15		*	LM2903P	IC		
IC15			NJM2903D	IC		
IC16			TC4011BP	IC		
IC16			UPD4011BC	IC		
IC17		*	TA78006AP	IC		
Q1 ,2			2SC2408	TRANSISTOR		
Q3		*	DTC143ES	TRANSISTOR		
Q3		*	RN1001	TRANSISTOR		
Q4		*	DTA143ES	TRANSISTOR		
Q4		*	RN2001	TRANSISTOR		
Q5		*	DTC143ES	TRANSISTOR		
Q5		*	RN1001	TRANSISTOR		
Q6		*	DTA143ES	TRANSISTOR		
Q6		*	RN2001	TRANSISTOR		
Q7		*	DTC143ES	TRANSISTOR		
Q7		*	RN1001	TRANSISTOR		
Q8		*	2SC945A	TRANSISTOR		
Q9		*	2SA733A(P)	TRANSISTOR		
Z1		*	DSA-301LA	SURGE ABSORBOR		
35	2A	*	W02-0883-08	ANT MODULE UNIT		
36	1B	*	W02-0884-08	LED UNIT		
<b>LED UNIT (W02-0884-08)</b>						
C1 ,2			CK45B1H103K	CERAMIC 0.010UF K		
J1 ,2		*	E40-5380-05	SOCKET		
R1 -22			RD14CB2E242J	RD 2.4K J 1/4W		
S1 ,2		*	S59-0442-08	DIP SWICH		
S3		*	S59-0443-08	DIP SWICH		
S4		*	S31-0407-08	SWITCH		

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U: PX(Far East, Hawaii) T: England M: Other Areas

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# TRC-70

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× New Parts  
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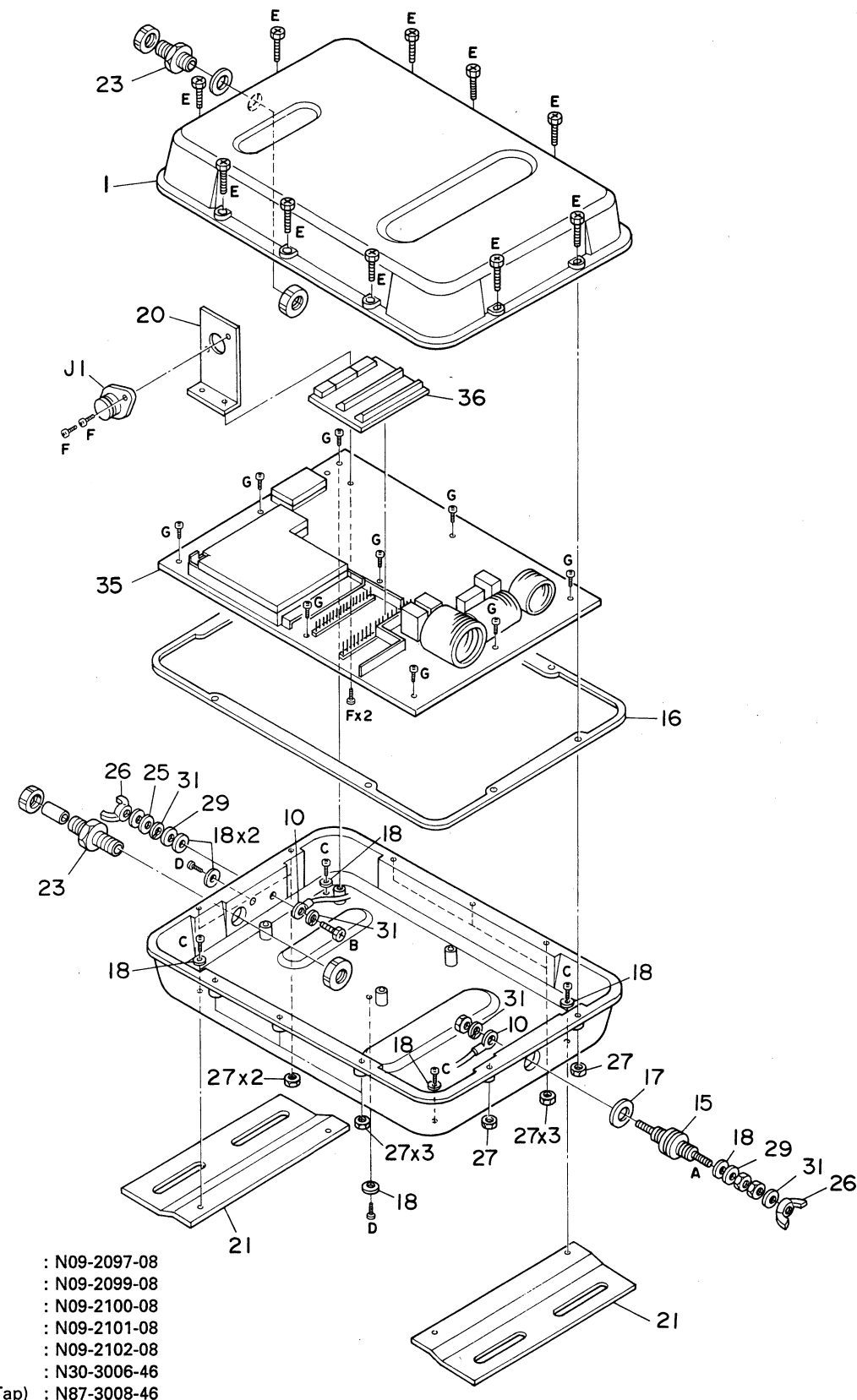
Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
D1 -22 D23 -46 IC1 , IC2 IC3		* *	B30-0880-05 1S1588 DRL8-472 DRL6-472	LED DIODE DIODE ARRAY DIODE ARRAY		

E: Scandinavia & Europe   K: USA   P: Canada   W: Europe  
U: PX(Far East, Hawaii)   T: England   M: Other Areas  
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 indicates safety critical components.

## MAT-100 (AUTOMATIC ANTENNA TUNER)

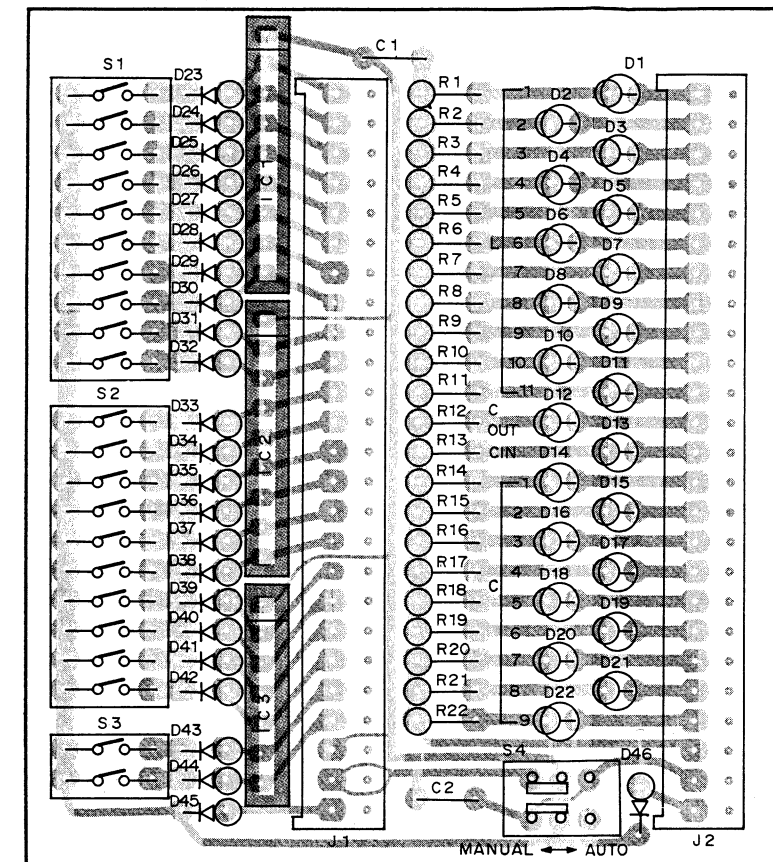
Exploded View



- |   |                 |               |
|---|-----------------|---------------|
| A | M5 x 65         | : N09-2097-08 |
| B | M5 x 25         | : N09-2099-08 |
| C | M5 x 10         | : N09-2100-08 |
| D | M5 x 8          | : N09-2101-08 |
| E | M4 x 16         | : N09-2102-08 |
| F | M3 x 6          | : N30-3006-46 |
| G | M3 x 8 (Br-Tap) | : N87-3008-46 |

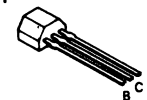
PC Board View

LED UNIT (W02-0844-08) Component side view

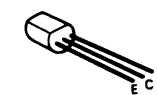


IC1, 2 : DRL8-472 IC3 : DRL6-472  
D1 - 22 : B30-0880-05 D23 - 46 : 1S1588

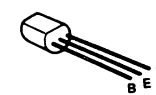
DTA143ES  
DTC143ES  
RN1001  
RN2001



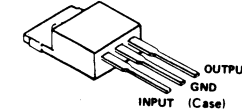
2SA733A  
2SC945A



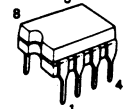
2SC2408



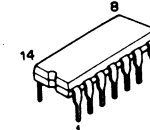
TA78006AP



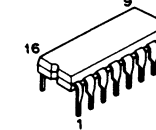
μPB553AC



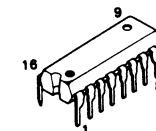
TC4011BP  
μPD4011BC



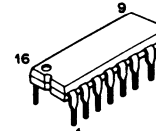
TC4053BP  
μPD4053BC



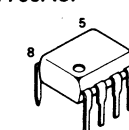
MSM5501



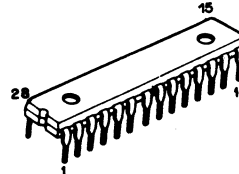
TD62003P



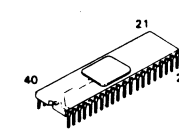
LM2903P  
NJM2903D  
TL7705ACP



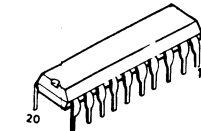
μPD7004C



HD6301V1K08PJ



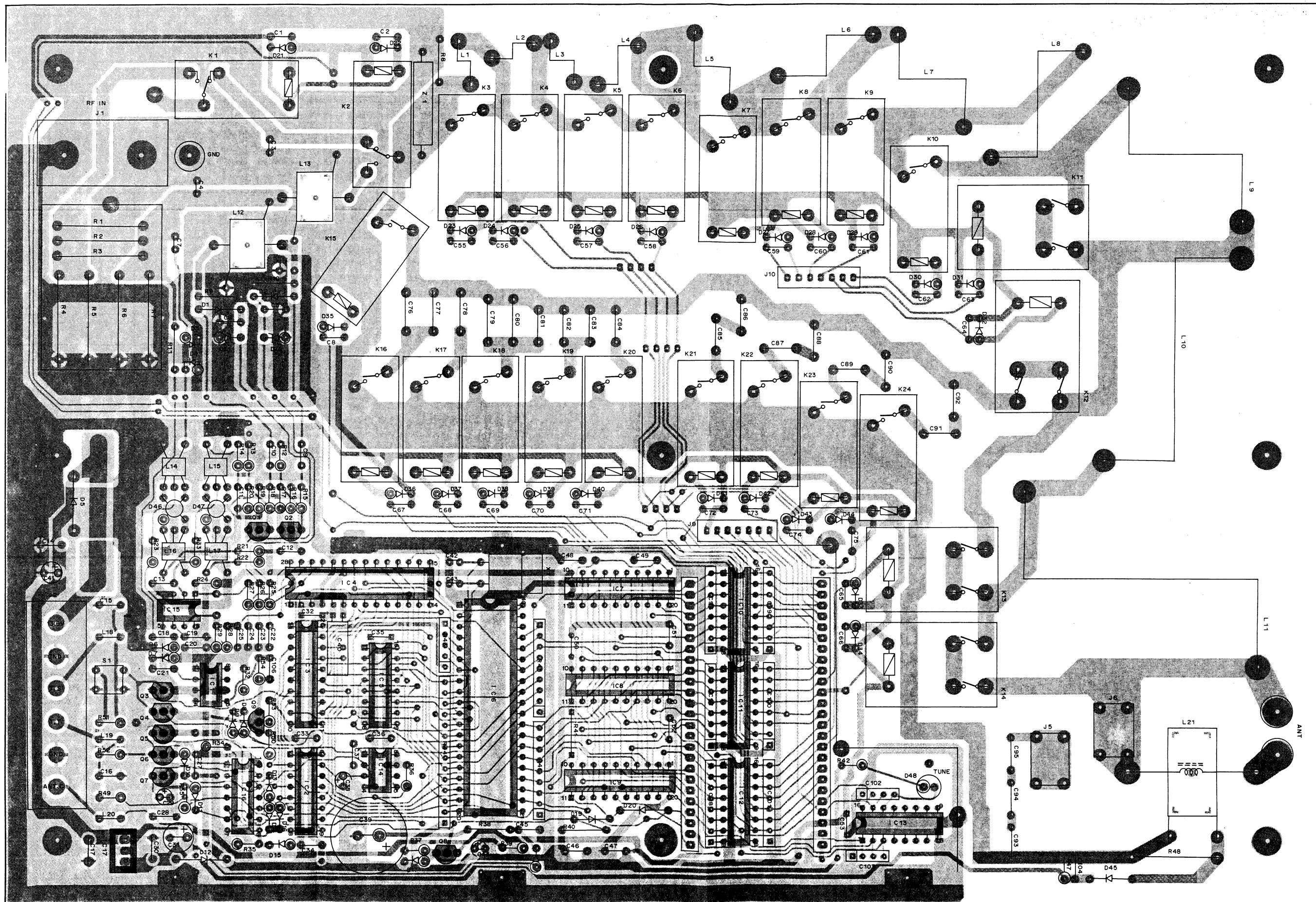
μPD74HC373C



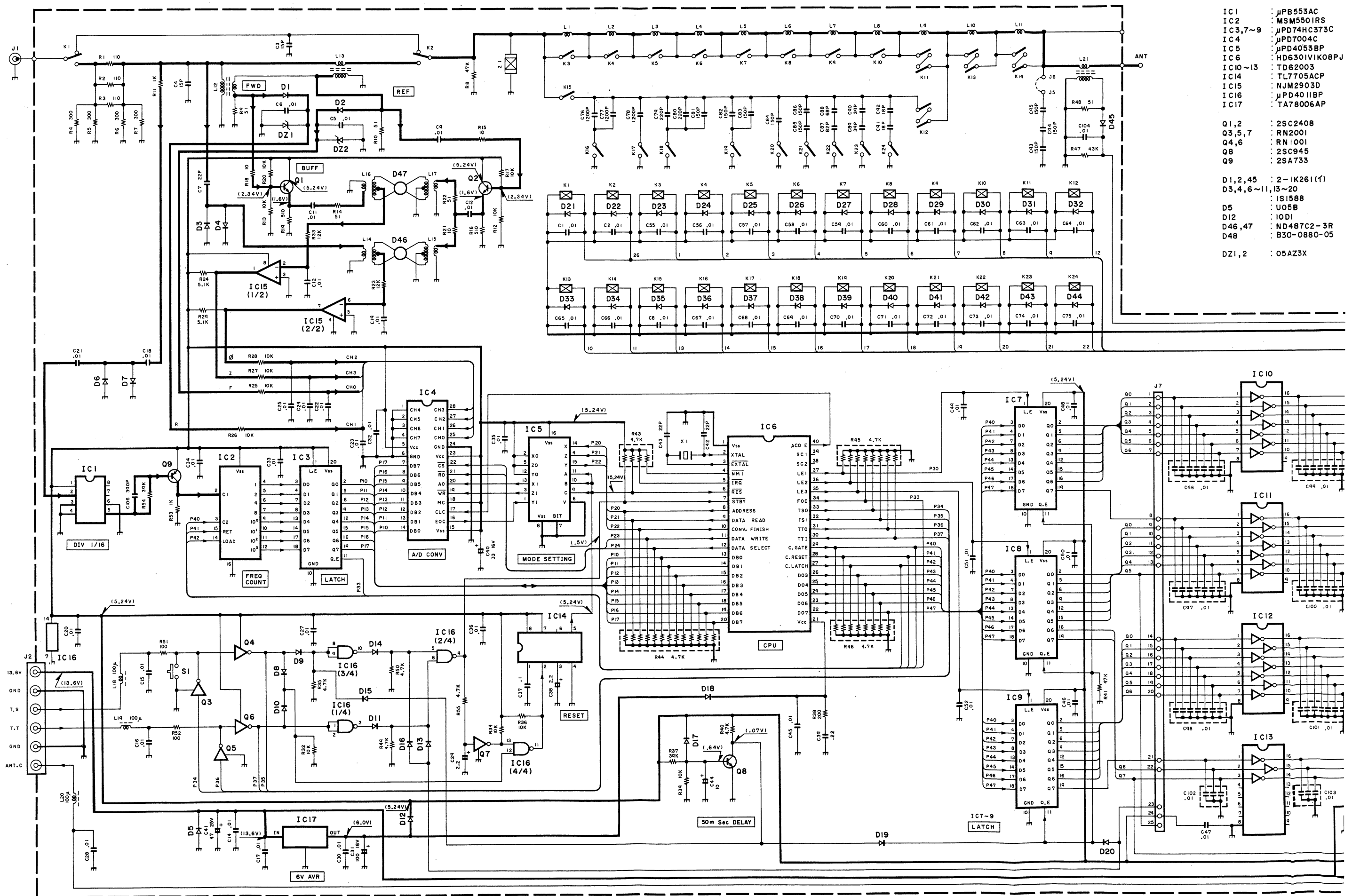


# TRC-70 MAT-100 (AUTOMATIC ANTENNA TUNER)

ANT MODULE UNIT (W02-0883-08) Component side view



# Schematic Diagram



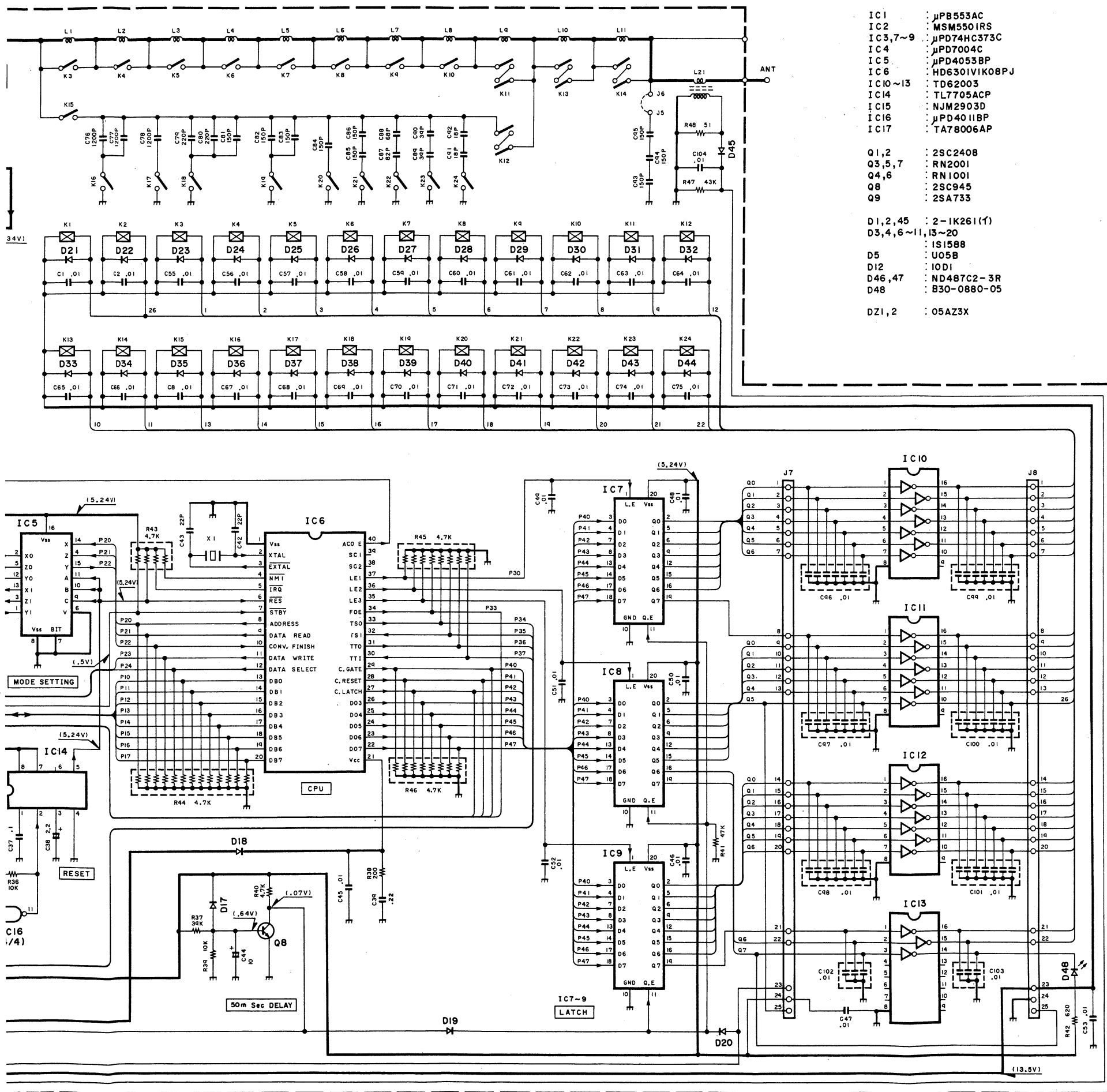
IC1 :  $\mu$ PB553AC  
 IC2 : MSM5501RS  
 IC3,7~9 :  $\mu$ PD74HC373C  
 IC4 :  $\mu$ PD7004C  
 IC5 :  $\mu$ PD4053BP  
 IC6 : HD6301VIK08PJ  
 IC10~13 : TD62003  
 IC14 : TL7705ACP  
 IC15 : NJM2903D  
 IC16 :  $\mu$ PD4011BP  
 IC17 : TA78006AP

Q1,2 : 2SC2408  
 Q3,5,7 : RN2001  
 Q4,6 : RN1001  
 Q8 : 2SC945  
 Q9 : 2SA733

D1,2,45 : 2-1K261(1)  
 D3,4,6~11,13~20 : 1S1588  
 D5 : U058  
 D12 : IOD1  
 D46,47 : ND487C2-3R  
 D48 : B30-0880-05

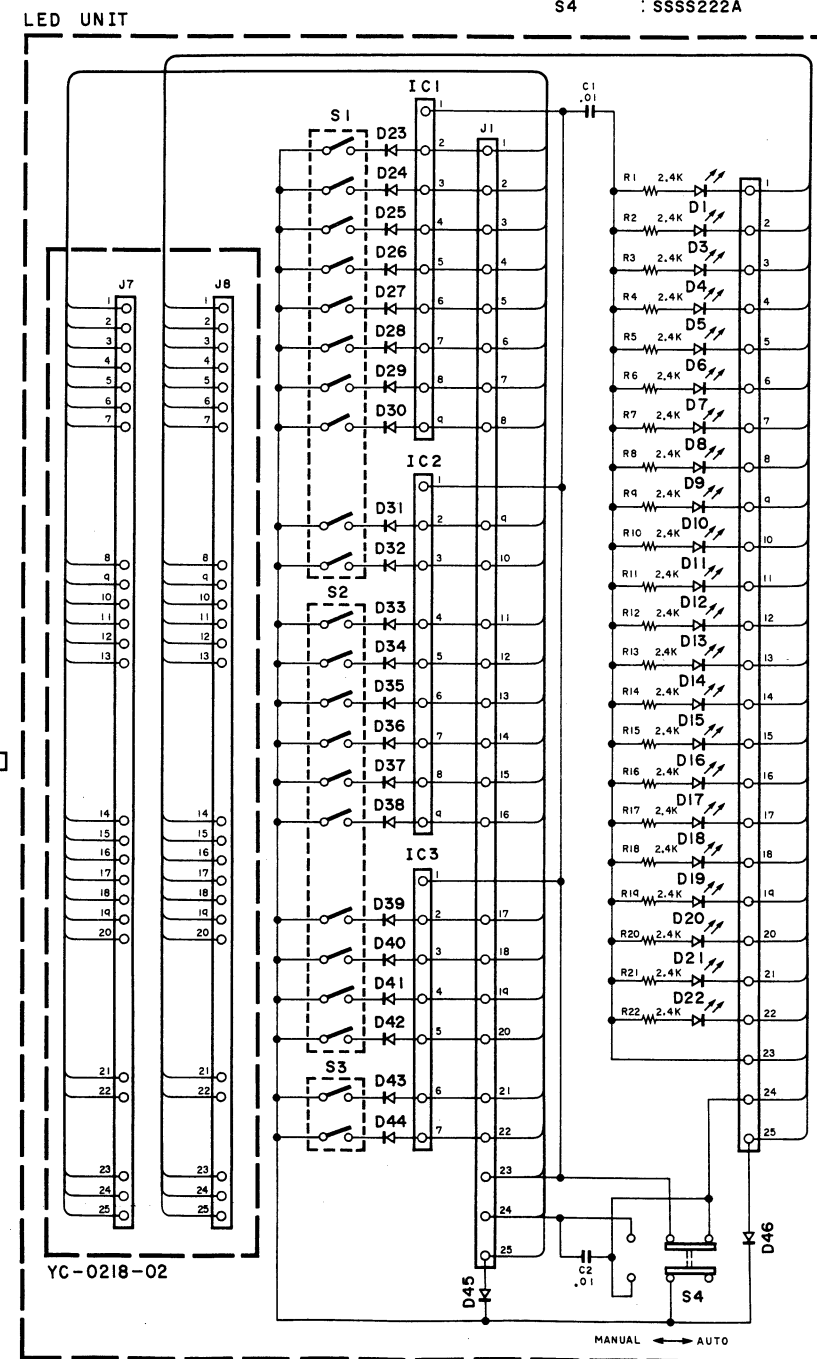
DZ1,2 : 05A23X

# MAT-100 (AUTOMATIC ANTENNA TUNER) TRC-70



- DZI,2 : 05AZ3X

- S1,2 : KSD-10  
S3 : KSD-02  
S4 : SSSS222A





## Installation Instructions

## • Antenna

The type of antenna that is used will greatly affect the performance of the equipment. The antenna should be erected as high as possible.

Keep the antenna as far from any object which may affect it's performance, such as metallic masts or other guy wires, as possible.

Insulator should be able to withstand leakage even when wet.

The base of the antenna is **HIGH VOLTAGE**.

It should be connected to the lead-in insulator.

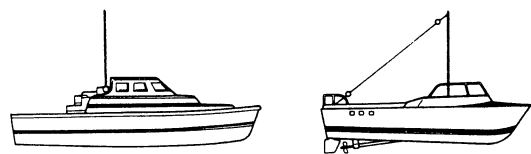
Do not touch the base of the antenna.

Certain lengths of antenna element are difficult for the system to tune.

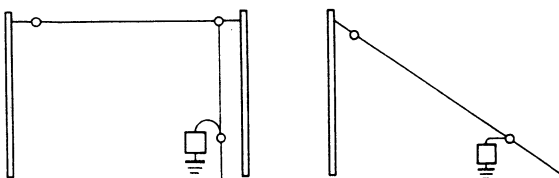
Element length to be avoided

$$= 300 / \text{operating frequency (MHz)} \times 1/2 \times \text{integer}$$

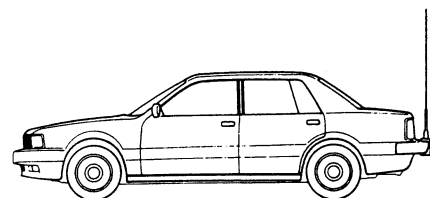
## SHIP STATION



## FIXED STATION



## VEHICLES



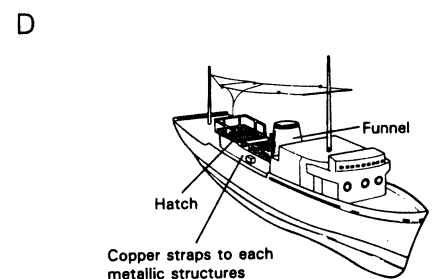
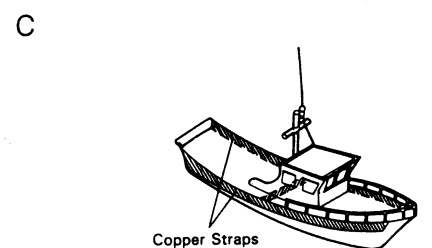
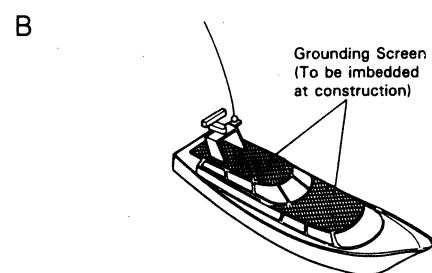
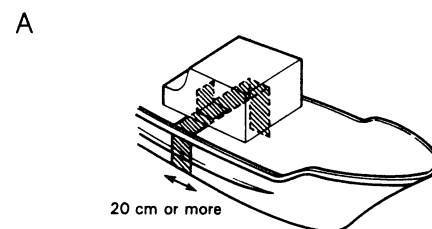
## • Ground

The MAT-100 must be connected to a good electrical ground. Without a good ground an SSB radio-telephone cannot work satisfactorily. It is of the utmost importance to ground the antenna coupler unit.

If boat provides a good ground, use less than 2 m of heavy gauge wire to connect. To extend the length use a copper strap.

When good ground is not provided use a copper strap to run from the outside of the boat to the ground terminal of the antenna coupler.

## SHIPS WITH A NON-CONDUCTING STRUCTURE



## • Antenna coupler

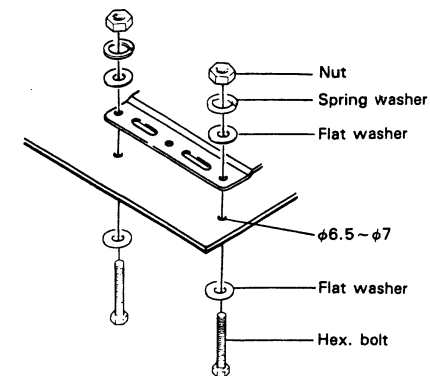
## INSTALLATION

The MAT-100 is protected by weather proof construction which permits the flexibility of interior or exterior installation.

Before installation note the following precaution.

1. Good ground connection
2. Avoid water spray
3. The base of the antenna is **HIGH VOLTAGE**.
4. Use caution when tightening the wing nut on the GND and antenna terminal. Over tightening may cause twisting of the terminals inside the coupler.

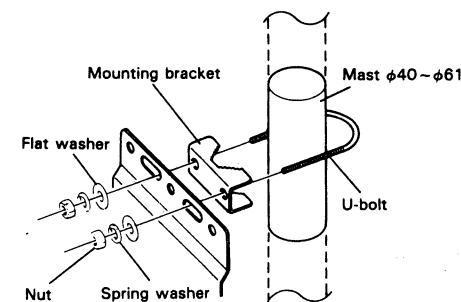
## 3. Installation by Hex Head Screws



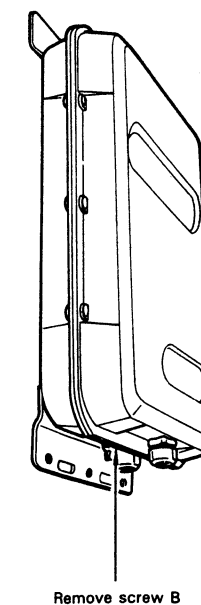
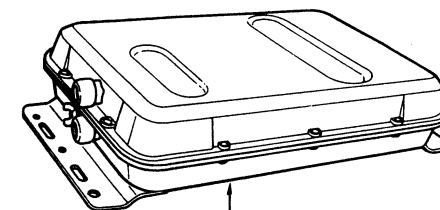
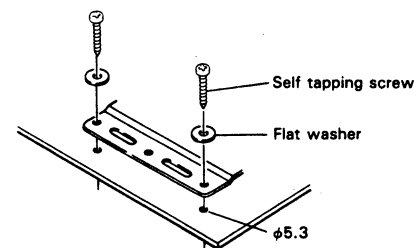
Two drain holes are provided.  
If the coupler is installed horizontally remove screw A, and if installed vertically remove screw B.

Three kinds of installation are available for any type of ship.

## 1. Installation by U-clamp



## 2. Installation by Self tapping Screws



**MAT-100 (AUTOMATIC ANTENNA TUNER)**

TRC-70

TRC-70

**MAT-100 (AUTOMATIC ANTENNA TUNER)**

• Antenna coupler

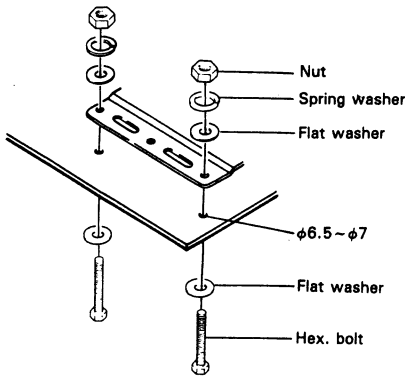
**INSTALLATION**

The MAT-100 is protected by weather proof construction which permits the flexibility of interior or exterior installation.

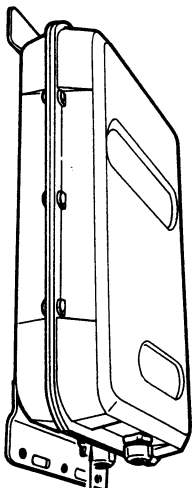
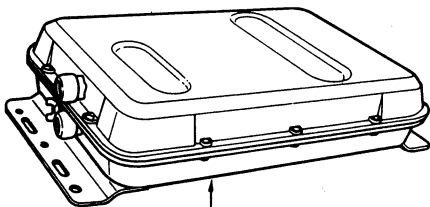
Before installation note the following precaution.

1. Good ground connection
2. Avoid water spray
3. The base of the antenna is HIGH VOLTAGE.
4. Use caution when tightening the wing nut on the GND and antenna terminal. Over tightening may cause twisting of the terminals inside the coupler.

**3. Installation by Hex Head Screws**

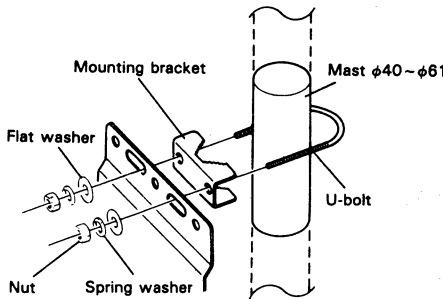


Two drain holes are provided.  
If the coupler is installed horizontally remove screw A, and if installed vertically remove screw B.

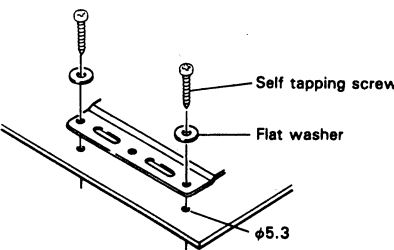


Three kinds of installation are available for any type of ship.

**1. Installation by U-clamp**



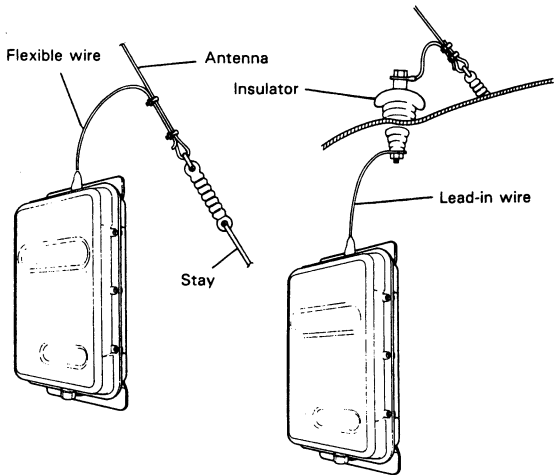
**2. Installation by Self tapping Screws**



• Connection

**WIRE FOR ANTENNA**

The insulator must be relieved from mechanical stress by using a short flexible wire between the insulator and a support.

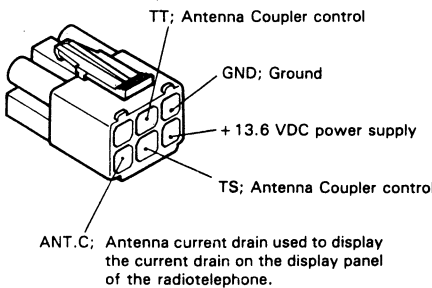


Lead-in insulator, such as GTO15 ( 15kV resisting presser ) should be able to withstand high voltage.

**CONTROL CABLES**

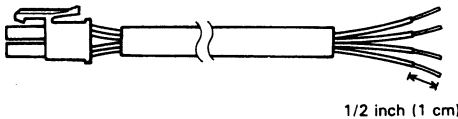
The MAT-100 requires a control cable consisting of between 4-5 wires of at least AWG24 guage. The cable must be shielded.

1. Connect the 6-pin plug to rear of the radiotelephone.



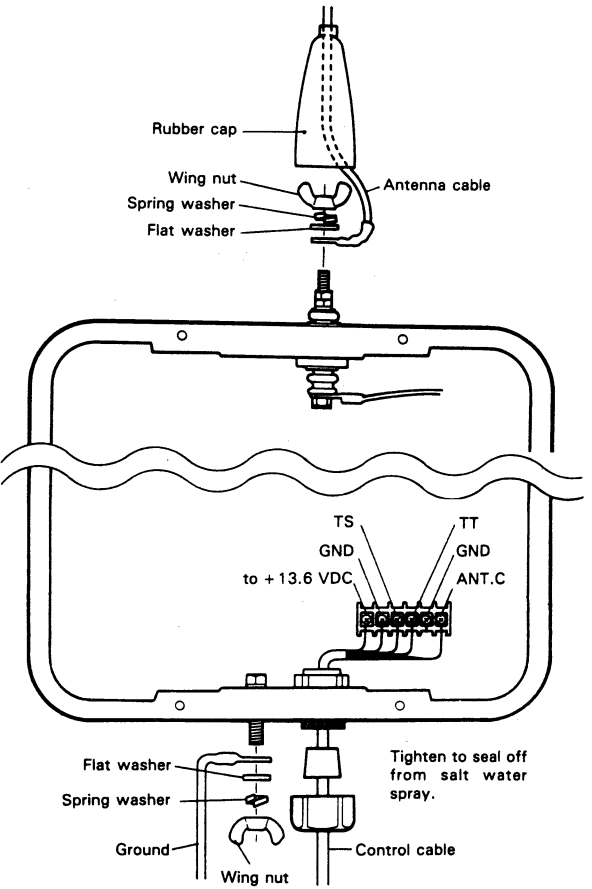
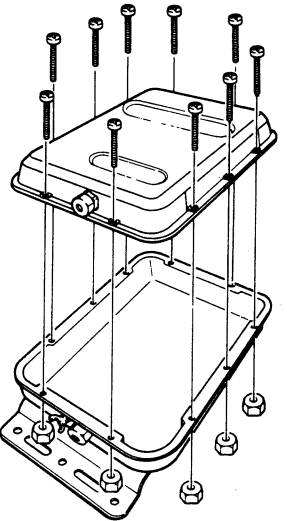
A 5 wire control cable is needed if you want to connect the ANT.C pin. Please refer to the MAT-100 Service Manual for further information on this function.

2. Strip the other side of the cable as shown below.



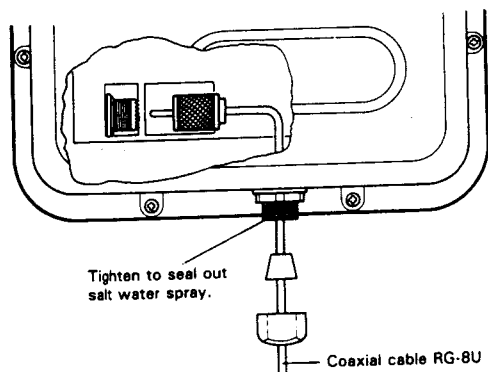
**3. Connect the wires .**

Be sure none of the wires are shorting against the others.

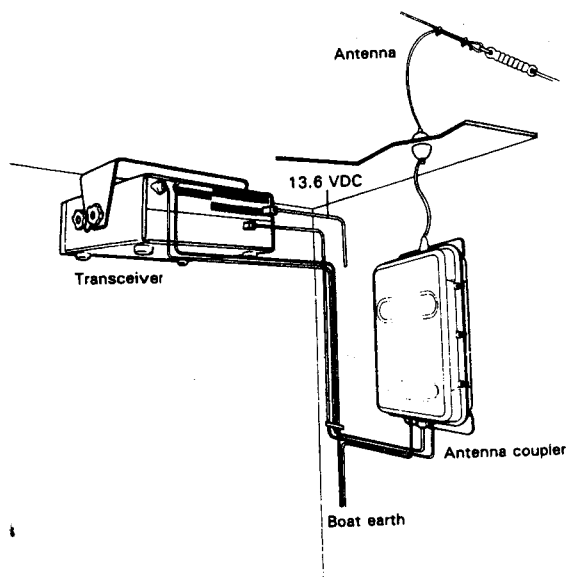


## MAT-100 (AUTOMATIC ANTENNA TUNER)

4. Connect thru case of the Antenna coupler to Antenna connector of the radiotelephone with coaxial cable.



### TYPICAL INSTALLATION



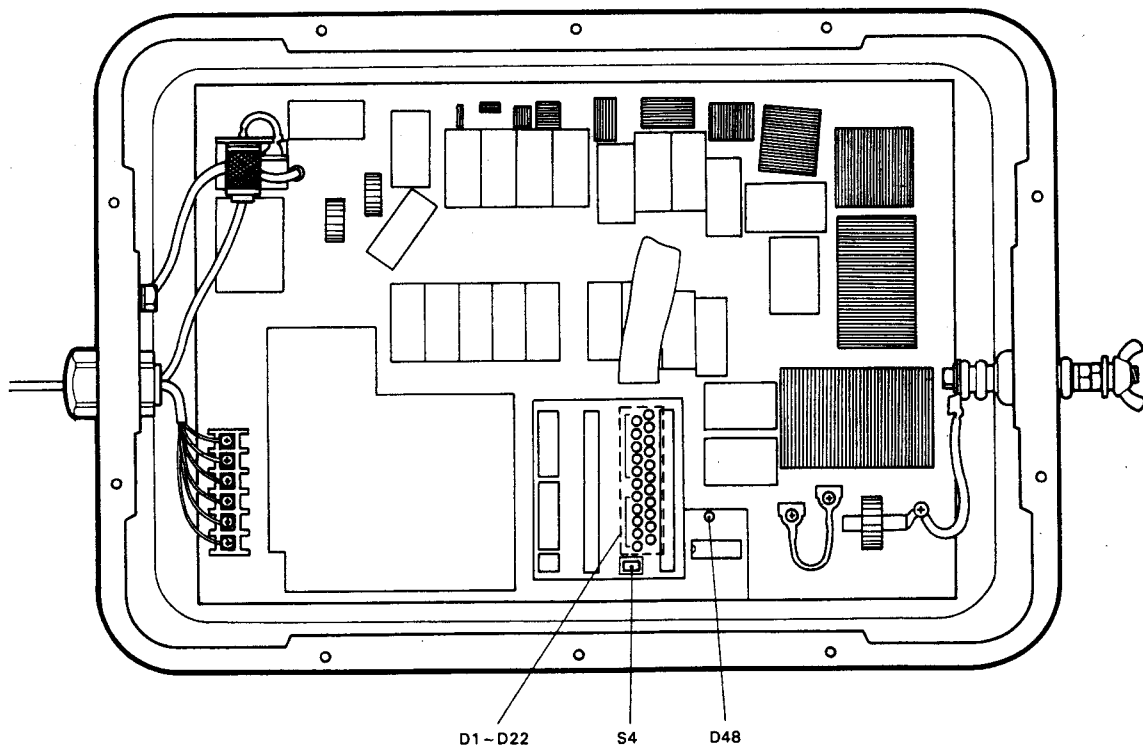
# TRC-70

## MAT-100 (AUTOMATIC ANTENNA TUNER)

### Manual Tuning

If the control circuit in the MAT-100 does not function properly, should an emergency arise, you can still transmit on 2182 kHz ;The MARINE MOBILE EMERGENCY CHANNEL by switching the coupler to MANUAL OPERATION.

1. Turn the radiotelephone power switch off.
2. Remove the top cover of the antenna coupler.
3. Confirm S4 is in AUTO position.
4. Turn the radiotelephone power switch on.  
Press the 2182 key and then the TUNE key.
5. After completing the tuning, D48 LED indicator of the antenna coupler will light.
6. Record the status of D1to D22 LED indicators on or off.
7. Set the S4 slide switch to MANUAL position.
8. Set the S1 to S3 dip switch as the same position as step 6.
9. Change the S4 switch back forth between AUTO and MANUAL position to confirm no change in the D1to D22 LED indicators.
10. Set S4 to be AUTO position.
11. Attach the top cover of the antenna coupler.



**MAT-100 (AUTOMATIC ANTENNA TUNER)****Specifications**

<b>Frequency range</b>	1.6 MHz to 30.0 MHz
<b>Power Capability</b>	150W PEP 100W continuous
<b>Input Impedance</b>	50 $\Omega$
<b>VSWR</b>	less than 2.0
<b>Tuning Power</b>	10 W
<b>Antenna Required</b>	7 to 23 m(23 to 75 feet); 2 to 30 MHz 2.7m(9 feet)whip; 3.5 to 30 MHz
<b>Tune-up Time</b>	Within 2 to 15 sec (Within 0.5 sec on pre-tuned frequencies)
<b>Power Supply requirement</b>	13.6 VDC $\pm$ 15% Negative Ground max2 A ( supplied from radiotelephone)
<b>Operating temperature</b>	-30 °C to +60 °C (-4 °F to +140 °F)
<b>Dimensions</b>	W258×H425×D90 [mm]
<b>Weight</b>	3.0kg
<b>Case Construction</b>	Weather Proof
<b>Control Cable</b>	5 cables (Not supplied)

# TRC-70

## SPECIFICATIONS

Receiver Frequency range	500 kHz to 30.0 MHz
Transmitter Frequency range	2.0 to 2.9999 MHz 4.0 to 4.9999 MHz 6.0 to 6.9999 MHz 8.0 to 8.9999 MHz 12.0 to 12.9999 MHz 16.0 to 16.9999 MHz 22.0 to 22.9999 MHz
Mode	J3E,H3E
Antenna impedance	50 Ohms
Operating temperature	-30 °C to +60 °C (-4 °F to +140 °F)
Power requirement	13.6 VDC $\pm$ 15%
Grounding	Negative
Current drain	RX max. less than 2 A TX max. less than 30 A
Frequency stability	$\pm$ 20Hz(After 10 minutes warm up)
Dimensions	W270×H96×D270
Weight	5.1kg
Output power	HI ;150 W PEP MEDIUM ;50 W PEP LOW ;25 W PEP

Spurious radiation	less than 65 dB
Microphone impedance	600 $\Omega$
Circuitry	Double conversion superheterodyne
Intermediate frequency	1st ; 71.295 MHz 2nd; 10.695 MHz
Sensitivity ( 12 dB SINAD )	500kHz~1.999MHz J3E;less than 1.0 $\mu$ V H3E;less than 5.6 $\mu$ V 2MHz~29.999MHz J3E;less than 0.5 $\mu$ V H3E;less than 2.8 $\mu$ V
Selectivity	-6dB J3E;more than 2.35kHz H3E;more than 6kHz -60dB J3E;less than 4.6kHz H3E;less than 20kHz
Spurious response	better than 70 dB
Output ( 10 % distortion )	more than 4 W
External speaker impedance	4 $\Omega$

## KENWOOD CORPORATION

Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

### KENWOOD U.S.A. CORPORATION

COMMUNICATIONS & TEST EQUIPMENT GROUP

P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745, U.S.A.

### KENWOOD ELECTRONICS DEUTSCHLAND GMBH

Rembrücker Str. 15, 6056 Heusenstamm, West Germany

### TRIO-KENWOOD U.K. LIMITED

KENWOOD House, Dwight Road, Watford, Herts., WD1 8EB United Kingdom

### KENWOOD ELECTRONICS BENELUX N.V.

Mechelsesteenweg 418 B-1930 Zaventem, Belgium

### TRIO-KENWOOD FRANCE S.A.

13, Boulevard Ney, 75018 Paris, France

### KENWOOD LINEAR S.P.A.

20125, Milano-via Arbe, 50, Italy

### KENWOOD ELECTRONICS AUSTRALIA PTY. LTD.

(INCORPORATED IN N.S.W.)

4E, Woodcock Place, Lane Cove, N.S.W. 2066, Australia

### KENWOOD & LEE ELECTRONICS, LTD.

Wang Kee Building, 5th Floor, 34-37, Connaught Road, Central, Hong Kong

### KENWOOD ELECTRONICS CANADA INC.

P.O. BOX 1075, 959 Gana Court, Mississauga, Ontario, Canada L4T 4C2